IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication FEBRUARY 9, 1961

Leonard Schugar

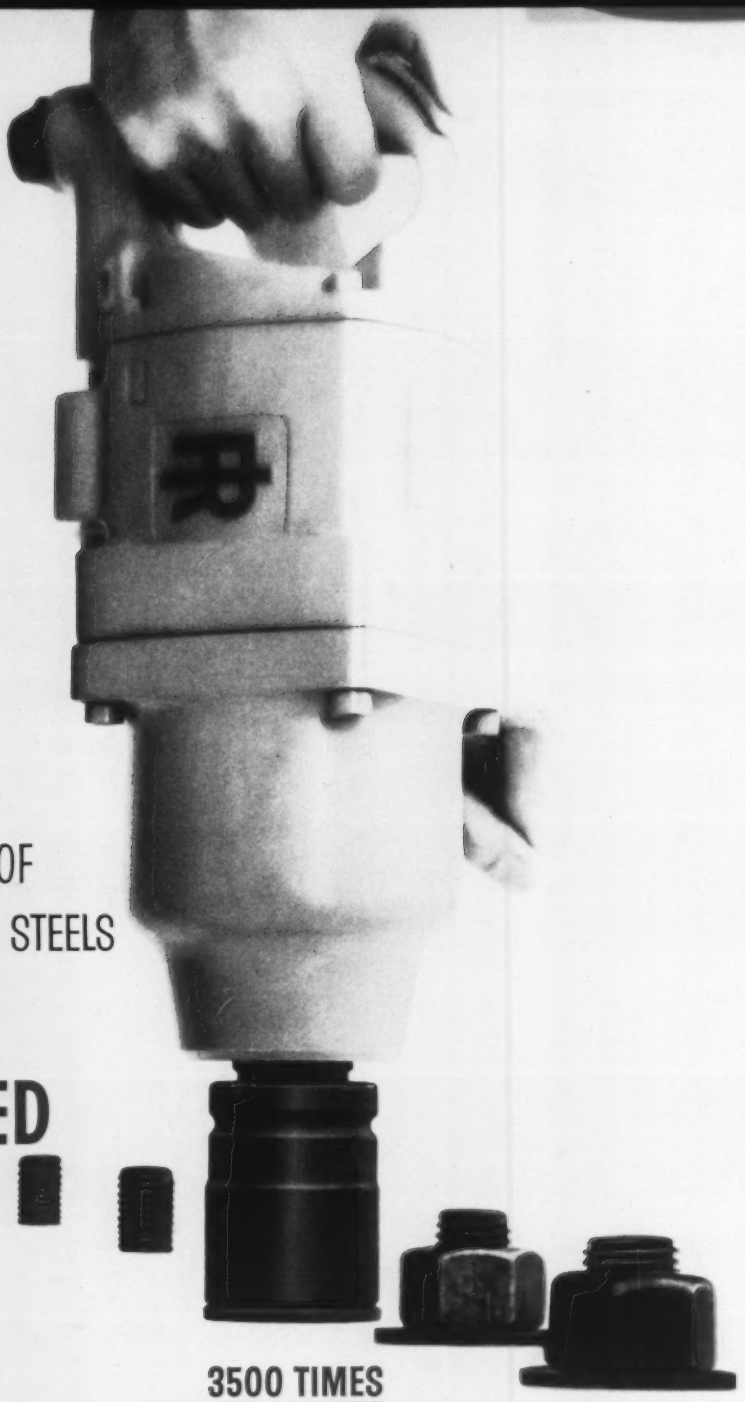
★ Pittsburgh Coke's Marshall, Dean and Mackay:

Pig Iron's Stake In Gas Injection p. 107

How Bad Weather Hurt Industry p. 77

Is An Auto Strike Shaping Up? p. 80

Digest of the Week p. 2-3



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THE IRON AGE, published every Thursday by CHILTON COMPANY, Chestnut & 56th Sts., Philadelphia 39, Pa. Second class postage paid at Philadelphia, Pa. Price to the metalworking industries only or to people actively engaged therein. $2 for 1 year, $3 for 2 years in the United States, its territories and Canada. All others $15 for 1 year; other Western Hemisphere countries, $25; other Foreign Countries, $35 per year. Single copies 50¢. Annual Review Issue $2.00. Cable: "Chilton," Philadelphia

The IRON AGE

February 9, 1961—Vol. 187, No. 6

Digest of the Week in

★Starred items are digested at right.

EDITORIAL

Righteous Indignation: Whatever Happened to It? 5

METALWORKING NEWSFRONT

Business Forecast 7
Metalworking Labor 9
Washington 11
International 13
Techfront 15
Market Planning Digest 74
Report to Management 89
Spacefront 105
★The IRON AGE Steel Summary 149

NEWS OF THE INDUSTRY

★**Special Report:** Industry Reels Under Winter's Icy Blasts 77
★Defense Contracts Show Shift 79
★Auto Strike Hinges on Sales 80
★Battle for Can Market Continues 81
Computer Integrates Plant Data 82
Foreign Mills Study Sintering 83
★Are Price Controls Coming? 84
★Steel Profits Reflect Planning 85
★Automotive 91
West Coast 93
★Machine Tools 95

ENGINEERING-PRODUCTION

★Gas Injection Boosts Iron Output 107
★How to Fabricate Ductile Vanadium 110
★Jet Stream Cleans Stamping Dies 113
★Reverse Heat Treat Trims Costs 114
★Chip Breakers Extend Tool Life 117
★New Methods Pace Tool Design 118
Two Passes Weld Heavy Plate 120

MARKET AND PRICE TRENDS

★Purchasing 150
Iron and Steel Scrap Markets 154
Nonferrous Markets 156

REGULAR DEPARTMENTS

Letters From Readers 17
Fatigue Cracks 19
Men in Metalworking 96
You Arbitrate It 100
Patent Review 122
Free Literature 125
Design Digest 128
New Equipment 140

INDEX TO ADVERTISERS 170

News of the Industry

BAD WEATHER HURTS SALES

Eastern U. S. Hard Hit — Prolonged ice, snow and cold have helped depress sales in New England and Middle Atlantic states. Most affected: Auto sales, orders for appliances, construction and car loadings. P. 77

DEFENSE CONTRACTS

Who Got Them—There were few changes in the top ten defense contractors in 1960. But they got less business than in 1959. P. 79

AUTO LABOR

Sales Hold Answer—Whether or not the UAW strikes the auto industry later this year depends largely on economic conditions. Three years ago, when sales were low, workers stayed on the job. Conditions are the same. P. 80

PRICE CONTROLS?

Presidential Hints — President

Metalworking

Cover Feature

GAS INJECTION—Pittsburgh Coke & Chemical Company's C. T. Marshall, E. R. Dean and J. S. McKay report greater iron output, reduced coke needs when gas is injected in blast furnaces. P. 107

Kennedy has repeatedly called "stability of prices" as absolutely necessary for a sound U. S. economy. His newly-formed labor-management group is to study prices carefully. P. 84

STEEL EARNINGS

Planning Pays Off—Despite the early steel recession, most companies managed to make a pretty good showing. Efficient planning helped. But 1961 will be another tough year. P. 85

Engineering-Production Developments

DUCTILE VANADIUM

Fabrication Methods — A few years ago, ductile vanadium cost several hundred dollars a pound. With the current per-pound price under $50, vanadium has become more popular. New methods have been developed to work this relatively new metal. P. 110

HYDRAULIC JET STREAM

Cleans Stamping Dies—Powerful jet-cleaning units remove drawing compound and slugs that cause distorted stampings. The cleaners mix water with steam and detergent under pressure. A 120-mph discharge velocity makes hand scrubbing a thing of the past. P. 113

REVERSE HEAT TREAT

Trims Costs — Machining first and heat treating later allows an arsenal to work with material at 240 Bhn rather than 350-429 Bhn. Immersion heat treatment reduces distortion while maintaining the as-machined surfaces in their original conditions. P. 114

CHIP BREAKERS

Extend Tool Life—Chipbreakers are well known as tool savers. But by adding motion to a tool, they yield a major bonus. This action moves the tool's cutting edge against the cut and backs it away 200 times per second. P. 117

NEW MACHINING METHODS

Pace Tool Design—In even the most modern machine shops, outdated methods create production snags. No matter how good a new machine or tool may be, it's only effective if used properly. P. 118

Market and Price Trends

CAN MARKETS

Healthy Battleground—Can makers are delighted over the materials battle between tinplate and aluminum. They say they can't lose. And 1961 is expected to be a big year for cans. P. 81

AUTOMOTIVE

Chrysler's Aluminum Engine—Little has been said about this six-cylinder engine, despite the fact it has been in production since last September. P. 91

MACHINE TOOLS

Brighter Future—A study by the Dept. of Commerce predicts a better year for the machine tool industry. P. 95

STEEL SUMMARY

Up to Automotive—The disturbing news from Detroit outweighs scattered improvement. It's unlikely the steel market can make a comeback without better automotive steel orders. P. 149

PURCHASING

Adhesive Education—Men in the adhesive industry feel customer education is needed if sales are to increase. P. 150

NEXT WEEK

DEFENSE SPENDING

Billions for Defense—Sen. Paul Douglas is one of many critics of present defense procurement. In next week's report on defense spending, he and other authorities are interviewed on defense spending trends.

PORTABLE "SERVICE CENTER" sparks new ideas and savings

Hundreds of companies have saved money, improved products and cut production waste as the result of opportunities presented by the Ryerson "Metalogikit."

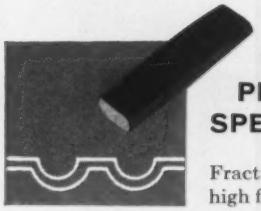
How? This unique kit is a veritable portable service center . . . lets you explore many alternatives to material you now use. For example, you can compare several different cutting methods on the same piece of steel to see which is best for your application.

Following are a few random examples showing how Ryerson specialists, using the "Metalogikit," have helped customers with a variety of problems—many similar to those you may face every day.

If you would like to put the Ryerson "Metalogikit" to work for you, call your Ryerson representative for a demonstration—for unbiased recommendations on steel, aluminum, plastics and metalworking machinery.

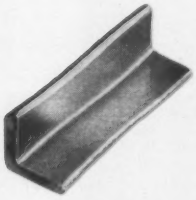
KIT SPOTS SAVINGS

Scratches and grooves normal to cold drawn, seamless tubing caused high manufacturing costs for a company making small, light-wall hydraulic cylinders. The small I.D. had to be honed to eliminate these faults—often too much metal was removed for proper piston fit. A Ryerson specialist suggested a switch to *welded tubing*. Using a sample from his "Metalogikit," he pointed out the better finish that eliminates expensive honing. The switch was made with these results: higher production, low reject rate, improved product, lower purchase price per foot of tubing.



KIT SUGGESTS PROFITABLE SPEC CHANGE

Fractures and rejects were extremely high for a manufacturer cold forming two severe bends in flat, hot rolled bars. A Ryerson specialist examined the ⅜" x 2" bar stock and compared it with a sample of M-1020 flattened round bar from his "Metalogikit." He explained how controlled carbon of Ryerson M-1020 bar would produce great cost-saving advantages in this operation over hot rolled, mild steel. After specs were changed to this Ryerson-supplied bar, fractures and rejects were substantially reduced—bringing new profitability.



NEW ANGLES FOR CUTTING COSTS

In making chairs, a furniture manufacturer was using *rolled* aluminum angles in 6061-T6 alloy where strength was not an important factor. A Ryerson aluminum specialist recommended using *extruded* angles in 6063-T5. Using a sample from his "Metalogikit," he pointed out that this angle would provide all the strength needed in the application, is more easily formed and has a better finish. The change in material was made—cutting costs 15¢ per unit produced.

STAINLESS FROM KIT LEADS TO SAVINGS

This company had an emergency requirement for stainless sheets. Application had always called for Type 304, 16 ga. x 66" x 81", *polished on one side*. Their Ryerson specialist questioned the need for polishing. From his "Metalogikit," he showed them a sample of 304 with a 2B finish. The company readily agreed it was exactly the finish needed *without polishing*—saving delivery time and material cost. The Ryerson man further suggested 16 ga. x 72" x 144", using the cutoff pieces for another job—reducing scrap waste on both requirements. Order was placed and delivered in plenty of time. Over-all result: a substantial saving.

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Righteous Indignation: Whatever Happened to It?

Probably a better name for this piece might have been: "Union Prestige: How Long Will There Be Any?" But you will get the point as we go along.

A few weeks ago, more than 100,000 people were thrown in an uproar with problems, frustrations, and worry. The cause? Fewer than 600 tug and ferry-boat workers, in a hassle with the railroads in the New York area, extended their picketing to areas not even remotely connected with the issues.

No one in the union seemed to give a tinker's damn about the plight of hundreds of thousands who had to take trains to work. In fact, the union pickets apparently were smug in the fact that they shut down the New Haven and the New York Central railroads. Had it not been for the common sense of Pennsylvania railroad workers, that road would have been shut down, too.

The same union arrogance was shown not too long ago by a newspaper mailers' union in the East. That strike was pulled off two weeks before Christmas. It cost stores millions, papers lost millions in revenue. And the people were kicked exactly as they were in the boat strike.

Now, what does this mean? Is the public going to stand still for this? Are the people in the Midwest going to say, "Well, it did not affect us, why should we worry?" We guess not.

We guess that every person who has recouped his ability to get up steam over such arrogance is waiting his chance to take a shot at all unions. No matter how fair and square most unions might be, AFL-CIO chiefs in Washington should put up the storm warnings. We mean warnings to all unions.

In the past, things like the ferry strike and its senseless picketing of areas not even involved, passed by with little reaction. This time it is different. So much so that President Kennedy had to dispatch his chief labor expert, Secretary of Labor Goldberg, to the scene.

That wasn't done just to end the strike. It was done to forestall a situation which was beginning to look ridiculous and asinine to the extreme.

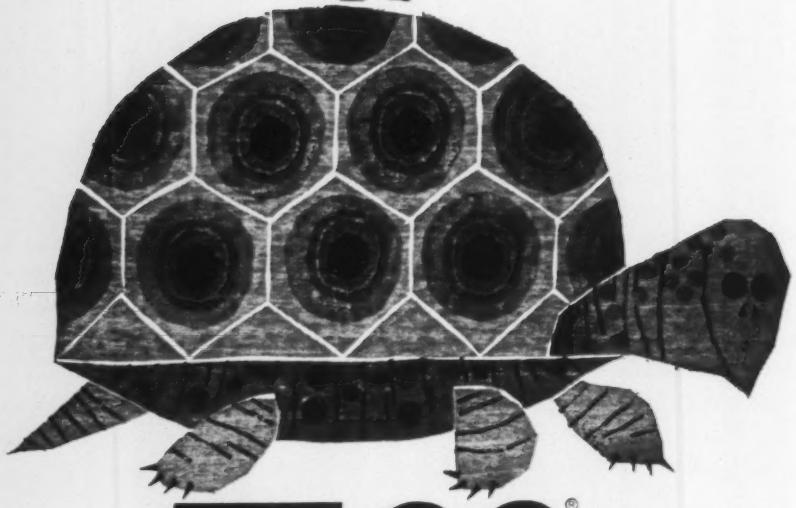
Maybe righteous indignation had taken a holiday. That is no longer the case. We predict that the man on the street "has had it." Top union strategy had better take another good look at those who are helping to get the strait jacket ready—for the unions.

People are tired of being kicked around!

Tom Campbell

Editor-in-Chief

WHAT SHELL IS TO A



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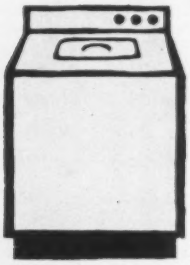

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Storms Add More Business Misery

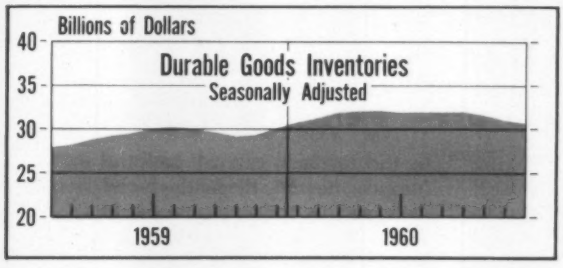
Last weekend's paralyzing storm heaped more misery on industries already suffering from the severe weather. (See Special Report, p. 77.) Sales of durables, particularly appliances and cars, are going to feel the effects more than is generally admitted.

Optimists hope that the severe winter will create a backlog of demand when the spring thaws clear the highways of the East and Midwest. Others believe that sales lost to the weather are lost forever.

On the good side, items like chains, heating equipment, sporting goods, snow tires are sold out and inventories will have to be replenished. This is small pickings, however, compared to lost durables sales.

Can Rebuilding Do It?

Last week, L. B. Worthington, president of U. S. Steel, put inventories of steel at about 10 million tons. This is about as low as they can get and as low as anyone can recall for a so-called normal period. It's also lower than the point many inventory specialists believed was the absolute minimum for normal production.

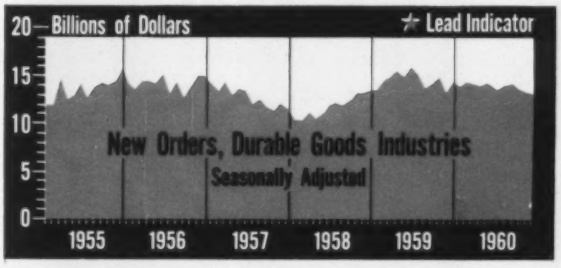


Factory stocks continue to drop—by about $350 million in December. Reduction since mid-year has been about $1.4 billion. Ordinarily, this would mean the start of a rebuilding period. But does it?

As recession sentiment has spread, low inventory levels have become something to be lived with. Right now, some flurries of buying could mean a new evaluation of what is considered the bottom. Some of the new buying may be just to cover bare spots and to put inventories in balance. But there are faint signs of efforts to put materials stocks at a higher level.

Orders, Sales Continue Decline

If there is stronger buying sentiment, as some businessman are pointing to, it isn't apparent in available statistics. Rates of new orders and sales continued to drop in December, maintaining the decline that has been continuous since last February. New orders for durable goods dropped to $13.35 billion in December,



down a bit from the $13.6 billion level in November.

Sales by durable goods industries declined by about the same amount; from $13.8 billion in November to $13.56 in December. Sales and orders were both off by about 2 pct in the November-December period.

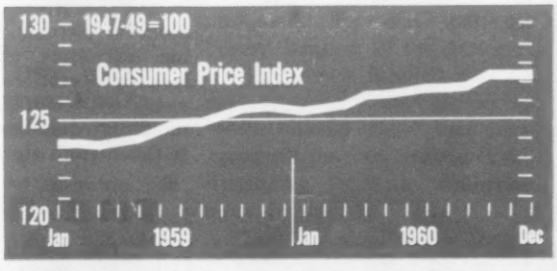
Effects of the Kennedy Program

How much will President Kennedy's first anti-recession measures help the economy? They probably will provide a moderate assist, plus some psychological help.

Defense spending is likely to provide the biggest prop. Particularly if it takes the shape of production items, not predominently research and development. The cut in FHA interest rate is not likely to bring on a wholesale housing boom, but it may point the way to a general easing of credit. Probably the current cycle will have to run its course for the most part.

Pressures Keep C-O-L Level

Pressures against price increases in metalworking continue. Principally because of the steady price levels in products served by metalworking, the Consumer



Price Index held at the same relative level through December. The minute increase from 127.4 in November to 127.5 in December (1947-49=100) makes it the second consecutive month of little change.

EF Walking Beam Furnaces

For heating copper and copper alloy cakes preparatory to rolling.
Also ferrous and non-ferrous billets preparatory to rolling, piercing or drawing.

The EF direct gas fired walking beam conveyor type furnace, pictured above, has capacity to heat 40,000 pounds of copper and copper alloy cakes per hour to 900° C; can handle cakes as large as 26″ x 8″ x 72″ long, weighing 4800 pounds each.

These furnaces can also be used to heat ferrous and non-ferrous billets and rounds preparatory to piercing, rolling, drawing, extruding and other hot forming operations. Usually furnished with completely automatic handling equipment. Raw stock is taken from storage, conveyed to the furnace, carried into the furnace, heated, discharged and conveyed to the next process in one completely synchronized automatic operation.

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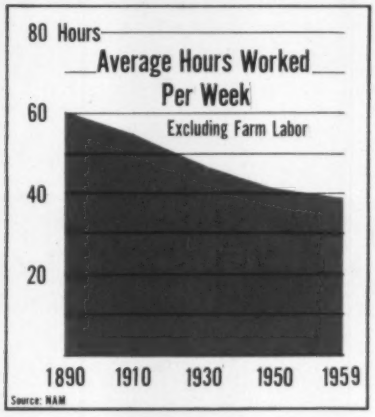
NAM: Set to Fight 32-Hour Work Week

When and if labor unions make an organized drive to get Congress



to lower the standard work week from 40 hours, the National Association of Manufacturers will be ready with its own counter-offensive.

In a study on "The Shorter Work Week Issue," NAM challenges the contention of labor leaders that a reduction in the work week is needed to offset the effects of automation on employment.

It points out that 27.5 million workers, only 42 pct of the work force, worked a 40 hour week in May, 1960. Sixteen million worked less; 21 million worked more—including 6.7 million who worked more than 60 hours per week.

Fewer hours at the same pay would force prices up substantially. This, claims NAM, would further weaken the ability of U. S. manufacturers to compete against foreign goods. The result: More unemployment.

Anyhow, says NAM, the average work week has gradually grown shorter (see chart) with or without legislation.

It also contends many workers don't want fewer hours; they want more money. NAM suggests, "The question of length of the work week should be reviewed as an option: What is the relative value to workers of more leisure as compared with more real income?"

UAW: Court Rules For Cross Co.

The Cross Co. doesn't have to recognize the UAW as bargaining agent at its Fraser, Mich., automation machinery plant.

This ruling, handed down by the Sixth Federal Circuit Court of Appeals in Cincinnati, reverses decisions by both the regional and Washington NLRB.

Cross and the UAW were bitter opponents in a 10-month strike by UAW Local 155 in 1959 and 1960.

The court dismissed unfair labor practice charges against Cross. And it said the company was justified in its complaint that the union used misleading campaign material in a 1958 representation election. NLRB said the election material was "permissible election propaganda."

Teamsters: Truckers Want Arbitration

The trucking industry has indicated it no longer believes it can effectively fight contract demands of the Teamsters alone.

Consequently, compulsory arbitration for the industry has been proposed by the executive committee of the American Trucking Assn. It endorsed, in principle, a resolution for legislation calling for impartial arbitration panels.

Tough Bargaining Ahead

Keeping collective bargaining away from government intervention and study groups is going to be one of management's toughest jobs in the next few years. And preserving the gains of the last few will call for all the firmness, skill, daring and innovation of which management is capable, a top labor advisor said in Cleveland last week.

Carroll E. French, president of Industrial Relations Counselors, Inc., New York, told the 20th annual Northern Ohio Personnel and Executive conference:

"The announced intention of the Administration to move to end what is called the 'cold war' between business and organized labor, the proposals for a permanent national labor-management advisory council and other indications tend to confirm the fear that in the next year or two, employers will find it more difficult than in the past to keep bargaining out of Washington."

He added that negotiations will also take more preparation since chances are greater they will end up in Washington. And many companies will have to strengthen and improve their customary approach and use "every weapon in the armory."

Mr. French labelled as "errant nonsense" the charge of "some union leaders" that management's tougher attitude at the bargaining table is deliberate union-busting.

"The real significance of this new posture is that management itself is belatedly facing up to the stern realities and the hard facts of collective bargaining," he said.

MAY, 1959—MERGER OF MEXICO REFRACTORIES COMPANY brings into Kaiser Refractories one of the nation's finest ranges of fireclay and silica brick, plus famous Mex-R-Co specialties.

FEBRUARY, 1960—KAISER TAR-BONDED DOLOMITE BRICK sets new production record in basic oxygen furnace—30,625 tons in 277 heats. Brick resists hydration in storage.

APRIL, 1960—NEW PERICLASE PLANT, Midland, Michigan, with capacity of 45,000 tons, increases Kaiser Refractories' annual capacity to 165,000 tons of high-purity MgO furnace grains.

AUGUST, 1960—NEW TECHNICAL CENTER under construction at Mexico, Missouri, augments application research and technical services of Research Laboratory at Milpitas, California.

OCTOBER, 1960—NEW BRICK FACILITIES under construction at Columbiana, Ohio, to make tar-bonded refractories for the basic oxygen steel process, supplements Moss Landing, Cal. plant.

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★ More Price Attacks Coming

Congress' antitrust griddle is heating up again.

U.S. metalworking's pricing practices have been singled out for investigation by Sen. Estes Kefauver's antitrust and monopoly subcommittee in 1961.

It is the "administered price" probe all over again. Only this time the framework is world trade.

Sen. Kefauver charges that concentrated industries — especially steel, autos, and machinery—are pricing themselves out of the world market.

The Tennessee Senator, in a report to Congress, contends that decline in exports by metalworking industries has been a major factor in the deteriorating condition of the U.S. balance of payments.

But, he says, statistical evidence on falling exports is not the only factor in the conclusion that "American producers of metal products have priced themselves out of the world markets."

Sen. Kefauver claims reports from commercial attaches of U. S. embassies throughout the world back up his argument. He says the attaches agree that the most important cause of the downward trend of U.S. exports is excessive prices."

Thus, the antitrust committee returns to charges of "administered prices" in metalworking.

In the report, the Senator says: "All of the metal industry groups (iron and steel products, automobiles, agricultural machinery, tractors, electrical machinery, and metalworking machinery) registered declines in the real volume of exports, accompanied by substantial increases in prices."

Listing petroleum, coal, chemicals, and textiles as other industries having held the same price pattern, Sen. Kefauver concludes:

"It may not be wholly a matter of coincidence that the price increases in these industries were much more limited in extent than in the metals group."

■ All Ahead On Missile Program

President Kennedy's order to speed up the entire U.S. missile program was being carried out even before it officially came.

Defense Secretary Robert S. McNamara had Pentagon officials studying ways to accelerate the missile program before the President's state of the union message was made, Defense Dept. sources disclosed. The missile report will go to the President before the end of the month.

In his message, President Kennedy called for "cutting down the wasteful duplications and time-lag that have handicapped the whole family of missiles." He specifically called for a step-up in the Polaris submarine program.

The Polaris order will mean at least five of the missile firing subs will be built ahead of schedule. The Navy says contracts for the five will be let before mid-1961.

■ Lobby Tax Bill Has Good Chance

Chances appear excellent for passage of the bill to restore tax deductibility on money spent by business for legislative purposes. The bill, introduced by Rep. Hale Boggs, D., La., got much support last year. But it came out of committee too late for Congressional action.

The Boggs bill, now bearing the number H.R. 640, was approved unanimously by the House Ways and Means Committee late last year. This year, Mr. Boggs introduced it early in the session. He hopes for enactment in this session.

The bill would allow a tax deduction for lobbying by business, and for advertising and association for legislative purposes.

■ Depreciation Bills Introduced

Legislation to liberalize depreciation methods grows by leaps and bounds in Congress. Among the bills under consideration are:

H.R. 3564, introduced by Rep. Wright Patman, D., Tex. This is a temporary tax relief bill. It would increase depreciation allowances on new machinery and equipment acquired in the 1961 and 1962 tax years.

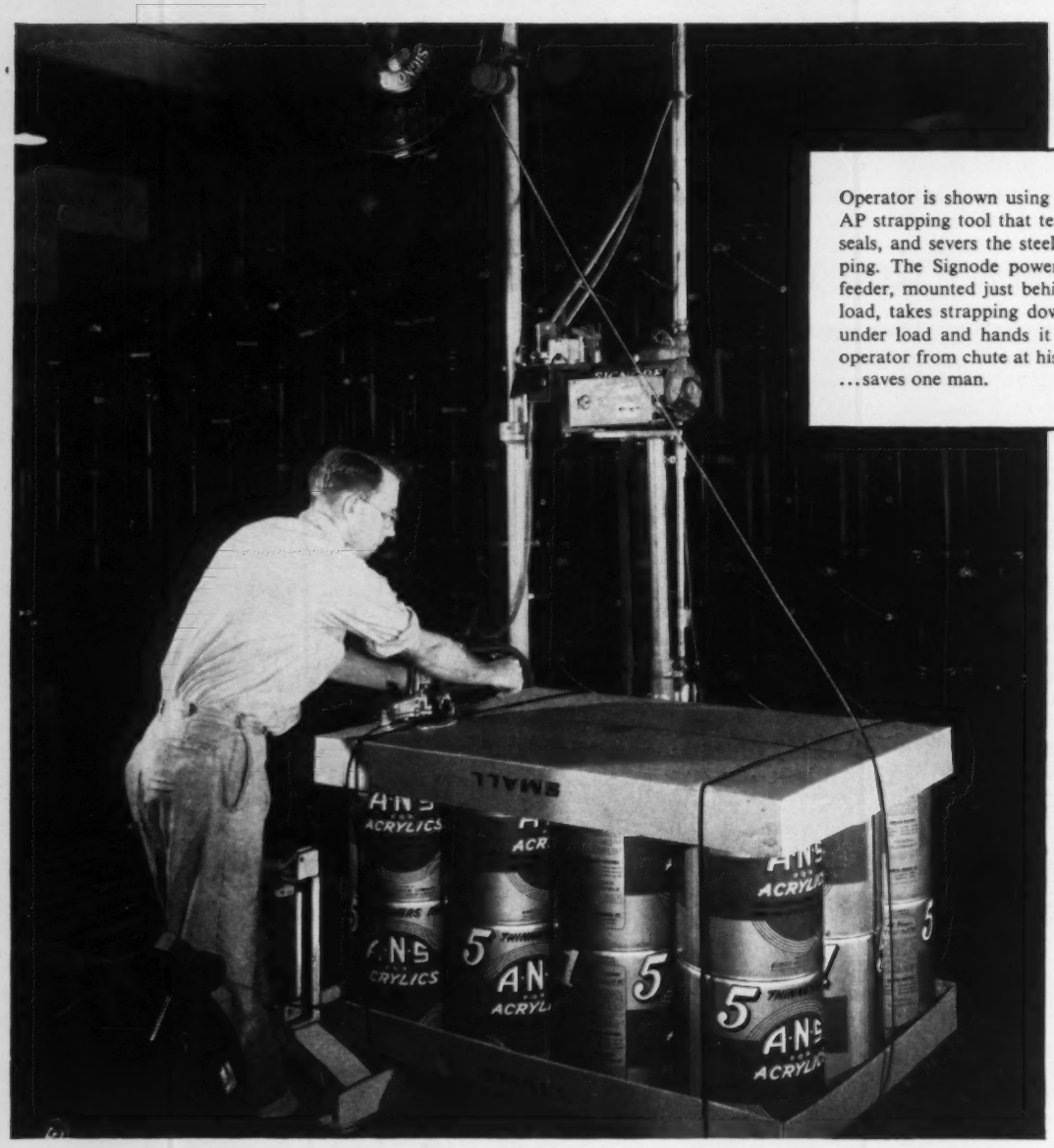
S. 378, introduced by Sen. John Sparkman, D., Ala. This one would give buyers of used equipment the same depreciation advantages enjoyed by buyers of new equipment.

S. 580, introduced by Sen. George Smathers, D., Fla. This bill would allow business to write off the entire costs of new equipment in five years.

■ Aid to Mining Policy Planned

The Government can be expected to establish a national mining and minerals policy this year. Moves to stabilize U.S. mining have the backing of the Administration and western Congressmen.

Sens. Gordon Allot, R., Colo., and Wallace F. Bennett, R., Utah, are pushing legislation seeking a national policy.



Operator is shown using Model AP strapping tool that tensions, seals, and severs the steel strapping. The Signode power strap feeder, mounted just behind the load, takes strapping down and under load and hands it to the operator from chute at his knees ...saves one man.

One Man Beats Empty Drum Flow

One length-wise strap and two straps around this unit load are applied by this one man in a few seconds—easily fast enough to keep up with the flow of empty drums.

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A Signode power strap feeder saves one man ...combines with an electric or air powered Signode strapping tool to make a remarkably inexpensive, fast, and versatile way to gain the advantages of steel strapping at lowest cost. Write for your copy of free folder "Signode Power Combination Tools."

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Reds Gain In Mineral Production

Communist countries are gaining on the U. S. in mineral production. The U. S. Interior Dept. reports that of 50 important minerals, the Communist countries lead the world in the output of 10. The U. S. leads in production of 21.

The Interior Dept. says the Communist World made "substantial advances" in mineral production in the past five years.

Russia, the department's Bureau of Mines reports, has replaced the U. S. as the world's leading producer of lead.

Exports to France Should Climb

The United States is now France's second best customer and her second biggest supplier.

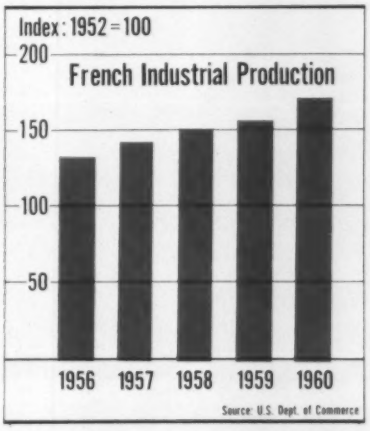
Figures recently released by the Dept. of Commerce show that, since 1950, the annual average of French imports from the U. S. was $544 million with a high of $826 million. Exports to this country averaged $260 million with an upward trend since 1954.

France's chief market, of course, is the European Common Market.

The outlook for industrial growth in France is called "excellent" by Commerce sources. The volume of export trade possibilities, specifically for the U. S., is on a rising curve. U. S. imports into France which require payment in dollars are now free from limitations, restrictions, and specific import licensing by the French government for the first time in over a generation.

There are, however, some U. S. industries that are finding difficulty cracking the French market. Among these are machine tools. French industrialists say that the cost of American machine tools is a barrier. But, more important, a deterioration in quality has been noted in these U. S. products.

The U. S. Trade Mission to France, which recently compiled a study, notes in a report to the Mission: "American products, at least in the field of engineering, are no longer as excellent all along the line as they used to be. Quality controls are not always as strict as in the past. Ups and downs are found in actual performance standards from one delivery to the next."



Ramblers Roll Again in Canada

Ramblers are again being made in Canada. A new $3.5 million assembly plant of American Motors Corp. recently began turning out Ramblers. The plant is located at Brampton, Ont., near Toronto.

This move follows criticism by AM president George Romney of Ford Motor Co. and General Motors Corp. foreign investments.

American Motors hasn't manufactured cars in Canada since 1957 when it closed its Toronto facilities. According to the company, 45 pct of the car's components will be made in Canada.

In the 1961 model year, only Classics, a middle-priced Rambler, will be produced at Brampton.

Expect More Ore From Venezuela

Two U. S. steel companies with extensive iron ore developments in Venezuela are expected to push for larger shipments this year.

Last year more than 19 million tons of iron ore were shipped out of Venezuela. Most of it came to the United States. It came from Bethlehem Steel Co.'s mines and from the big Cerro Bolivar mine of the United States Steel Corp.

Some sources say the faster pace is due to a fear of government takeovers in the future. Venezuelan officials, of course, say there is no cause for this fear.

Copper's Champion

President Kennedy and Congress have been called on to set up an International Copper Conference to stabilize world copper prices.

The call comes from Sen. Mike Mansfield, (D., Mont.). He has asked the President to consider calling the conference. In a statement before the Senate, he said some type of international "cartelization" was needed to help the copper industry.

Sen. Mansfield said the problem centers around declining copper prices and a 10 pct reduction in copper production in recent weeks.

Canada: Higher Taxes?

Owners of some mining projects in Quebec Province, Canada, are showing concern over reports that the new Liberal government will take a long look at the present tax laws regulating mining concessions.

This, of course, could very well mean higher taxes. It could, if this became the case, affect such companies as Quebec Cartier which will, when it completes its present project, have spent as much as $300 million.

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Bypass Air-Melting Stage

European vacuum melters are checking means of bypassing the air-melting stage prior to consumable-electrode melting. New methods would form electrodes directly from iron and alloying elements. Different elements would form in concentric cylinders, then they'd telescope together.

More Efficient Welding

A new welding process insures greater efficiency in spot, seam and projection welding. It's termed fiber-metal resistance welding. Basic concept involves fiber metallurgy, in which thin metal fibers are interlocked like a felt cloth. Use of a fiber-metal mat increases the ratio of the contact resistance to the bulk resistance. This lets the metal in the mat reach its melting point while the base metal remains cool.

Abandoned Ore Finds Use

Rubber conveyor belts speed the extraction of 60,000 tons of usable copper a year from almost 30-million tons of "worthless" ore. These high-strength belts keep returning the low-grade ore—in a closed cycle—to crushers, until it's reduced to pea-sized pellets. Three crushers and 16 belts make it possible to extract copper from ore which was abandoned 50 years ago.

Test Gas-Turbine Tractor

Undergoing tests at the Army's Fort Belvoir, Va., labs is a gas-turbine-powered caterpillar tractor. This huge earthmover had a standard 5000-lb Diesel engine, rated at 200 hp. It's now fitted with a 600-lb gas-turbine engine, rated at 206 hp. At present, heavier gearboxes offset some of the big weight differential.

Big Galvanizing Job

To assure long-term safety, the 23-in. diam suspension cables on New York City's new Throngs Neck Bridge will be protected from corrosion by 130 tons of zinc sheathing. A total of 7,700,000 lb of galvanized-steel wires will support the 13,953-ft long structure. The suspended span will total 2910 ft. For top corrosion resistance, each cable is being painted with a primer coat of metallic-zinc paint. This paint contains both zinc oxide and zinc dust.

Boosts Polishing Rates

Super-strength bonds secure rubber "tires" to metal hubs on polishing and grinding wheels. These adhesive bonds prevent explosive failures at speeds up to 19,000 rpm. They also insure dependable wheel service with little downtime at ever-increasing speeds. Faster speeds yield faster polishing rates and superior finishes.

New Magnetic Alloys

High-purity alloys serve as source material to make thin magnetic films for computer-memory systems. These magnetic alloys reduce a computer's memory-access time to one-billionth of a second. The new alloys are compounded and vacuum melted from ultrapure iron, nickel and cobalt. Trace impurities are kept to a few parts per million. Oxygen content runs slightly higher because solid deoxidizers are avoided.

Trace Impurity	Max. Present, ppm	Trace Impurity	Max. Present, ppm
H	0–1	Mg	3–30
N	0–1	Al	1–3
Ca	1–10	Mn	3–30
Si	1–10	C	5–40

Deoxidize With Coke

Tests by Polish metallurgists indicate that diffusion deoxidation with coke in a basic open-hearth furnace is more efficient than precipitation deoxidation. Adding coke to the molten metal prevents phosphorus from returning to the metal from the slag. It also prevents recarburization. When decarburization is intensified, diffusion deoxidation doesn't alter the heat's timing.

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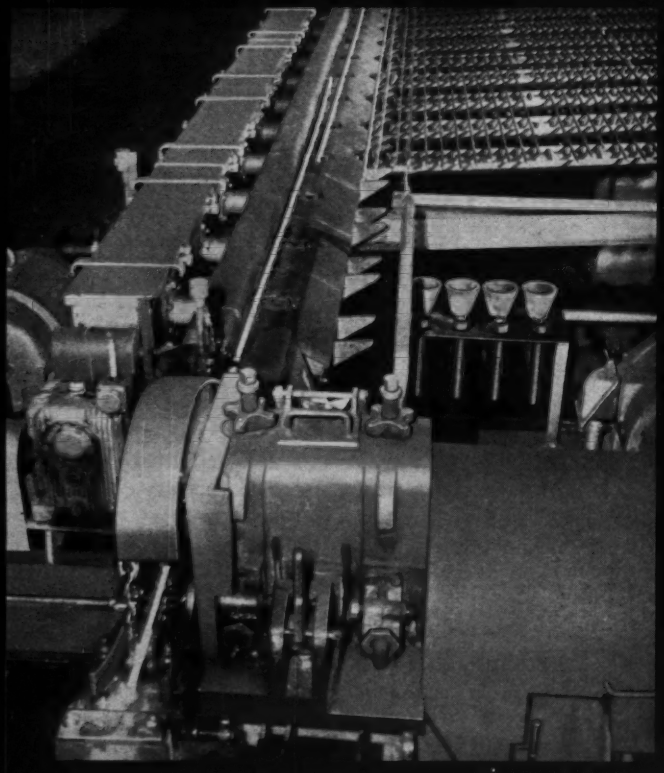
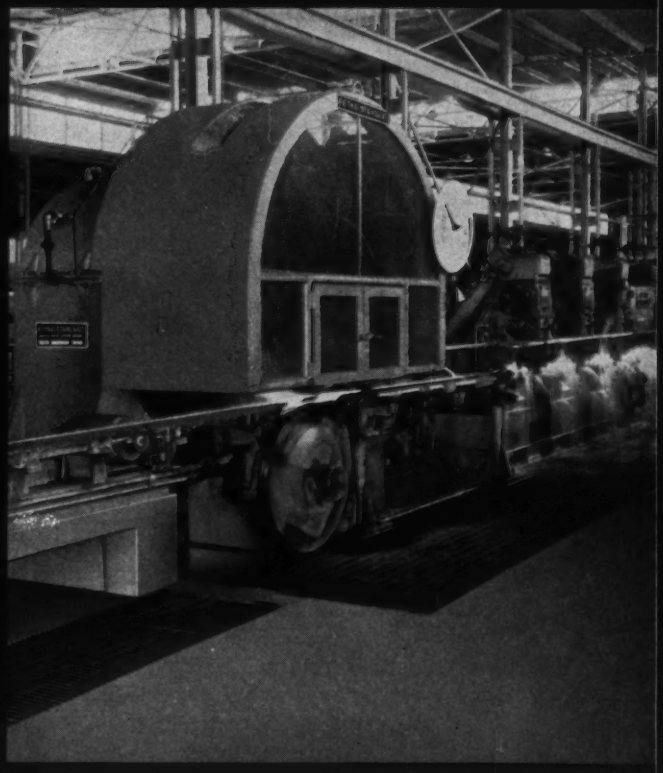
HIGH-SPEED PRODUCTION OF PIPE... (Small diameter)

by C. W. Mills, E. W. Mills, Seamless or Stretch Reducing





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- Transfers pipe to Cooling Beds at high speeds.
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- Cuts any desired length at close length tolerances.
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Uncoilers—Automatic handling of coils. No manual labor required.

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BLAW-KNOX

Labor Report

Sir—I read your editorial in the Jan. 19 issue ("Government Steel Report: Bill of Rights for Industry") and I disagree with your praise of the Livernash report.

It is difficult for me to understand how anyone with your knowledge of the steel industry and a general knowledge of the economy can fail to appreciate the fact that the steel industry has been one of the leaders in the general wage rise which has occurred in this country. The other industries are autos, building, trucking and defense. Had the steel commission stuck to its guns like General Electric, our little company would not have had to give a package increase of 25 cents in our bargaining last November. Government intervention in bargaining is one thing and I agree it should be discouraged. But the direct effect of strikes in large industries on our economy can hardly be disputed.—V. K. Scavullo, Legion Utensils Co., Inc., San Francisco, Calif.

Sir — It was with considerable pleasure that I read the good news about Dr. Livernash's report on steel negotiations and the fact that the report was forthright and logical. Your comments under the recent heading "Will Report Bring Changes?" was also read with a great deal of interest.

As you know, I have always been rather on the side of trying to prove you wrong and if you will just tell me how to get a copy of this report, I promise you it will be read and, further, it will be passed to others in our organization for reading and studying. The subject of the report will be brought up at every opportunity by our people when in contact with others of the industry.

I would like to say that I agree with everything you say about it, including the fact that only a few people who should read it will read it. Also, I believe that a great deal of the extraneous matter put out around steel strikes comes from having too many public relations men with overactive imaginations on the staff of some of the big steel companies. Also, of course, that segment of the press that likes sensationalism and tries to make a sensation out of a little thing like a stubbed toe are responsible.—Robert M. Sandberg, Columbia Tool Steel Co., Chicago Heights, Ill.

Sir—We would like to obtain a copy of the Labor Dept.'s report entitled "Collective Bargaining in the Basic Steel Industry."

If a copy of the report is available, I would appreciate your forwarding it to my attention. If, however, you are not able to supply this report, will you please let me know where it can be obtained.—Joseph A. Czescik, Pitney-Bowes Inc., Stamford, Conn.

■ **Copies of the report can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. The price is $1.25.—Ed.**

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This P&K Microdrawn® tubing solved a serious fuel line corrosion problem in jet engines. The answer: seamless tubing microfinished internally by a special P&K process. No grinding or polishing . . . no cavitation or particle removal problems.
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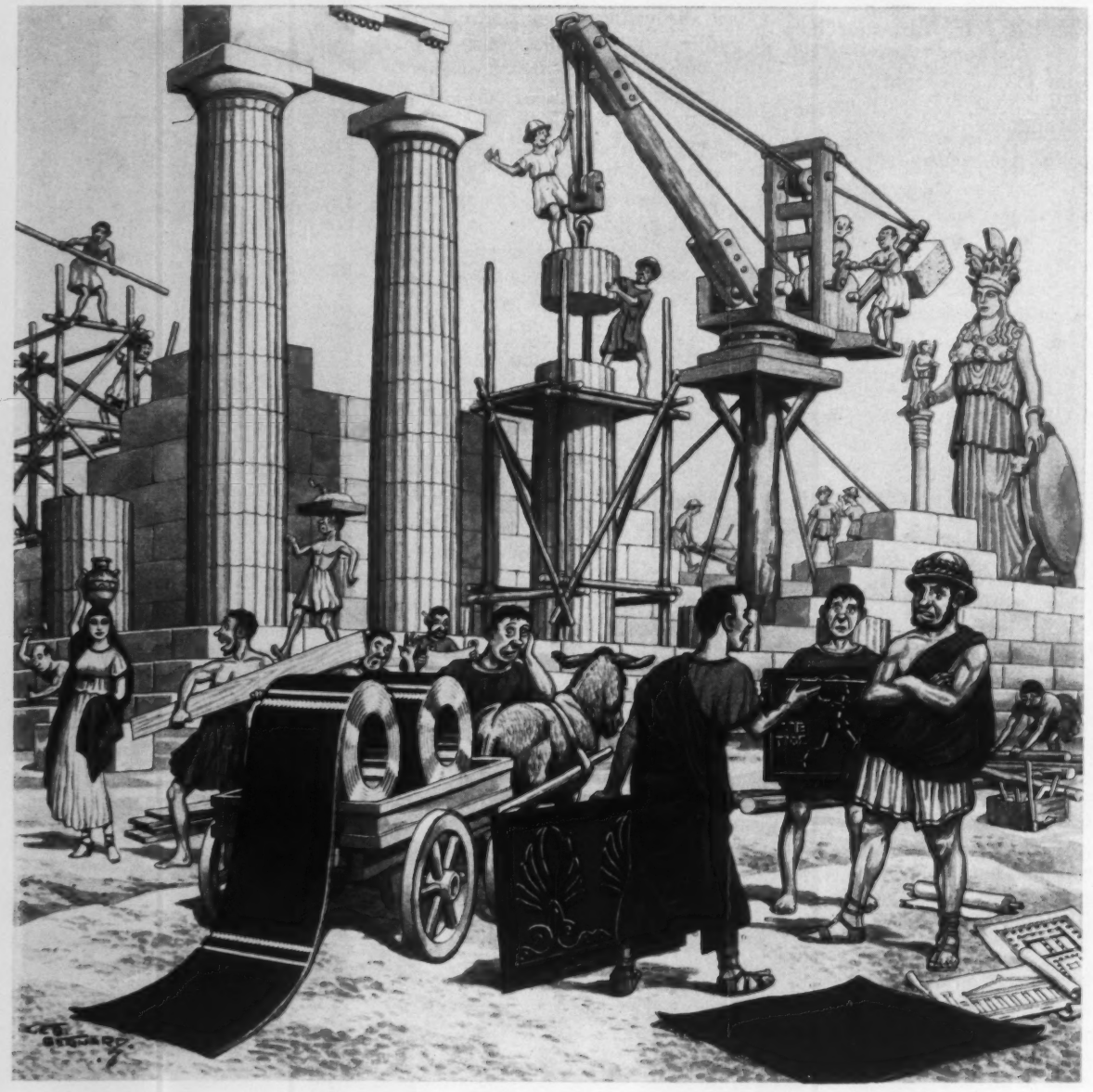
As early as 447 B.C. the young architect, Anacreon, went to see the Parthenon builder, Ictinus, to persuade him to use Washington Steel's ColorRold Stainless Steel as the curtain wall material. But Ictinus, a status quo seeker, obstinately refused.

No wonder the Parthenon now lies in ruins!
As Anacreon said to Ictinus, "Sure, your type of construction may last two or three thousand years, but if you want to build a *permanent* structure you should use Stainless Steel."



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Neither Snow Nor Sleet

So far it's been a wicked winter, especially along the East Coast. With this in mind, our news staff and district editors checked the impact of snow, ice, and extreme cold on industry and business. The result is this week's Special Report on p. 77.

While checking, we couldn't help but recall our own experiences in battling the snow. And some of the things we went through to meet our press deadlines and get The IRON AGE out promptly on schedule.

Everybody In—Our entire Philadelphia news staff was on hand the morning of Jan. 9 when about 13 in. of snow, drifting as high as 5 ft., halted most business activity. Other companies were either shut down or working with depleted staffs, but, sometimes traveling 15 or 20 miles by all manner of conveyance, including walking, our crew made it in.

Editor George Sullivan and Managing Editor Gene Beaudet proved their versatility by helping out with some of the routine chores they usually supervise.

Plan Ahead—Later in the month when other heavy snows were forecast, the news staff had a plan of action. On several occasions News Editor Dick Raddant and two key staffers, Larry Neal and Paul Cathey stayed in hotels overnight so there would be no delay in getting started the next morning.

District editors were asked to send all their stories to Philadelphia by teletype, rather than risk delays by mail. This made certain (1) the copy was the most complete, latest news on metalworking; and (2) it reached the home office by editing deadlines.

All this planning had only one aim: To make sure IRON AGE reached your desk on schedule with the up-to-date news of metalworking.

"You've sold me on your product—now sell me on your price!"

"Killed" Steel?

As everyone knows, steel companies are battling a wide variety of problems these days. But one mill has an additional burden: Critical attack by the local humane society.

The issue involves wayward cats and openhearth charging. An informant told the humane society the mill was clubbing cats that wandered onto its property. They were then thrown in the openhearths, the complaint alleged.

Tender Trappers—Denying the accusation, the mill pointed out it's trying to reduce—not increase—the amount of carbon in the melt. But the company's sense of unmerited guilt was not helped by the humane society's next move.

The cat protectionists insisted on planting traps around the property and plan to collect any trapped cats.

Going back into history, the last steel mill clash with cat-lovers came in 1952. One steel producer bought a rather loosely packed No. 2 scrap bundle. In his hurry to ship the bundle, the supplier had included a live cat in an uncrushed drum in the bundle. In this case, the cat was recovered, safe and sound.

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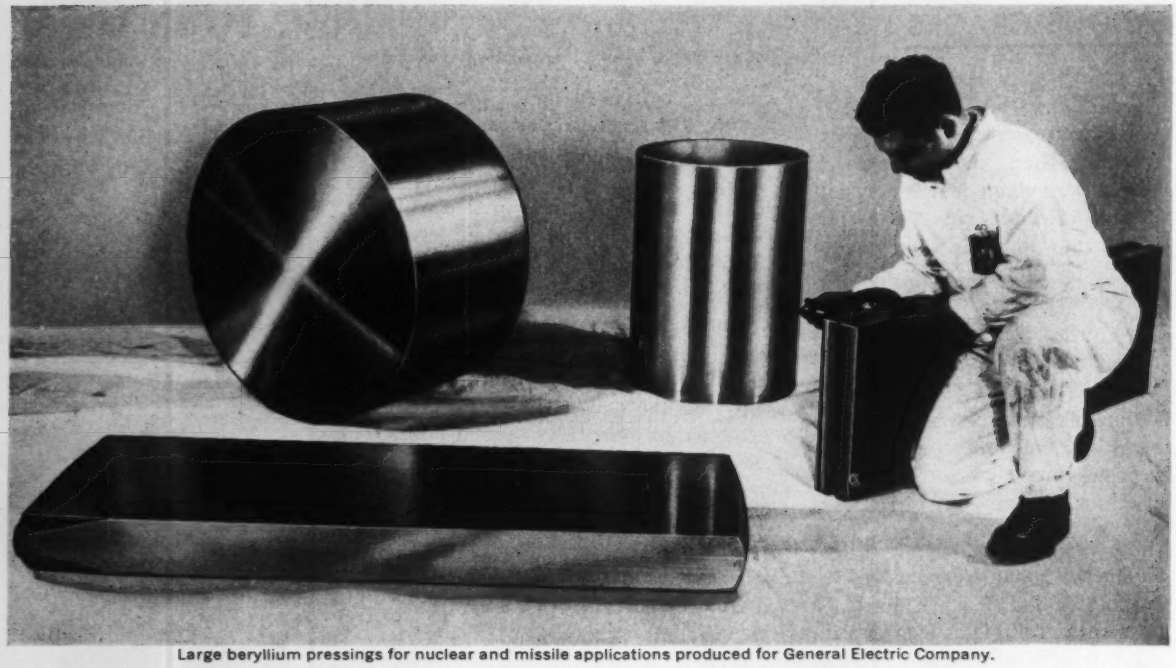

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BERYLCO's consistent research leadership is simplifying the transition from laboratory to production line for aircraft and missile makers using beryllium. Chemical and spectrographic analysis, physical and mechanical property research, and pilot plant studies help produce rigid quality control procedures as well as a constant source of new testing data. BERYLCO can also supply an experienced staff of field and plant technicians to assist you in your own product development, or product re-design, with beryllium. Call them in when you first start thinking about the advantages beryllium can add to your product's performance. Their ideas may help you eliminate some of those time-consuming steps between testing and production.

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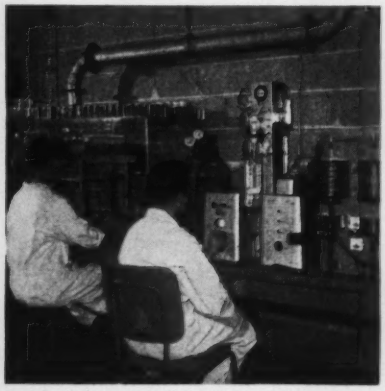
Spectrographic analysis of BERLYCO beryllium is important in controlling quality and assuring proper composition.



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COMING EXHIBITS

International Heating & Air-Conditioning Show—Feb. 13-16, International Amphitheatre, Chicago. International Exposition Co., 480 Lexington Ave., New York 17.)

MHI Pacific Coast Show—Feb. 22-24, Cow Palace, San Francisco. (Material Handling Institute, Inc., One Gateway Center, Pittsburgh 22.)

Western Metal Show — March 20-24, Pan Pacific Auditorium, Los Angeles. (American Society for Metals, Metals Park, Novelty, O.)

National Packaging Show — April 10-13, Lakefront Exposition Hall, Chicago. (American Management Assn., 1515 Broadway, Times Square, New York 36.)

Powder Metallurgy Show — April 24-26, Hotel Sheraton-Cleveland, Cleveland. (Metal Powder Industries Federation, 60 E. 42nd St., New York.)

Castings Show—May 8-12, Brooks Hall, San Francisco, Calif. (American Foundrymen's Society Golf & Wolf Rds., Des Plaines, Ill.)

Design Engineering Show — May 22-25, Cobo Hall, Detroit. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

MEETINGS

FEBRUARY

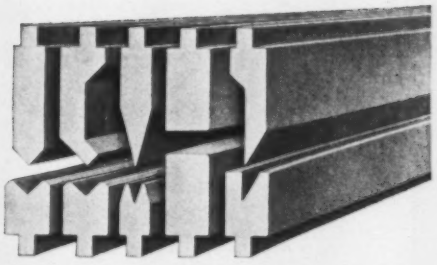
National Assn. of Manufacturers—Meeting, Feb. 15-17, The Riviera Hotel, Palm Springs, Calif. Association headquarters, Two E. 48th St., New York.

The Metallurgical Society of AIME—Annual meeting, Feb. 26-Mar. 2, Ambassador and Chase-Park-Plaza Hotels, St. Louis. Society headquarters, 29 West 39th St., New York.

Assn. of Iron & Steel Engineers—Western meeting, Feb. 27-Mar. 1, Hotel Statler, Los Angeles. Association headquarters, 1010 Empire Bldg., Pittsburgh.

(Continued on P. 23)

press brake tooling



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62 different sizes and styles • Most in stock for off-the-shelf delivery

CHICAGO standard type press brake dies are used for a large variety of bending operations in any make or size of standard press brake. They are economical, and the quick delivery saves time in tooling up. Available in any length from 4 to 12 feet in increments of 2 feet; *induction hardened* or Diekrome steel.

The local distributors listed below offer immediate delivery on many sizes and styles of standard type CHICAGO press brake dies. If you have Bulletin STD-959 you can order any standard type die by number. Why not ask your nearest distributor for a copy? Also, if your requirements call for special multibend and forming dies, he can tell you about Dreis & Krump complete tooling service for any make of press brake.

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REgent 9-2541
Tulsa
Hart Industrial Supply Co.
LUther 3-2175

OREGON
Portland
Hallidie Machinery Co., Inc.
ATlantic 2-2244

PENNSYLVANIA
Philadelphia
Delaware Valley Mchry., Inc.
OLdfield 9-4600
Milton Equipment Co.
WAlnut 2-1734
Pittsburgh
Wm. K. Stamets Co.
ATlantic 1-8091

TEXAS
Dallas
Briggs-Weaver Mchry. Co.
LAkeside 8-0311
Fort Worth
Briggs-Weaver Mchry. Co.
EDison 6-5621
Houston
Mehl Machinery, Inc.
FAirfax 3-1313

WASHINGTON
Seattle
Hallidie Machinery Co., Inc.
PArkway 3-9520

WISCONSIN
Milwaukee
Production Equipment, Inc.
GReenfield 6-6075

CANADA
A. R. Williams Mchry. Co., Ltd.

ALBERTA
Calgary—Phone: 5-4425
Edmonton—Phone: 24341

BRITISH COLUMBIA
Vancouver—TAtlow 9411
Victoria—Phone: 4-7623

MANITOBA
Winnipeg—SPruce 4-4458

NEW BRUNSWICK
Moncton—EVergreen 2-0049

ONTARIO
Hamilton—LIberty 9-8420
Ottawa—CEntral 3-4900
Toronto—RUssell 7-0521
Windsor—CLearwater 4-4762

QUEBEC
Montreal—RIverside 8-9381

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Press Brakes • Press Brake Dies
Hand and Power Bending Brakes
Special Metal-Forming Machines

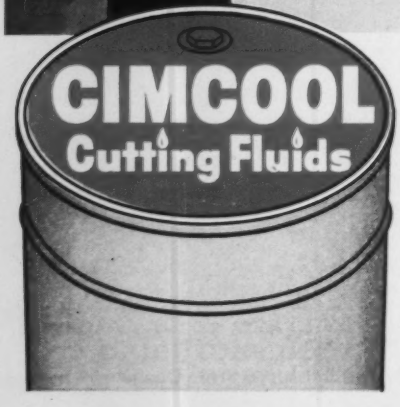
CHICAGO DREIS & KRUMP

DREIS & KRUMP MANUFACTURING CO.
7430 S. Loomis Blvd., Chicago 36, Illinois

PRODUCTION JUMPED 466%

when CIMCOOL S2, the world's leading chemical cutting fluid, got on the job in Chicago.
(Company name on request.)

PRODUCTION REPORT
SALES REPORT
2.
and they make electrical components. The trouble they were having was in the high production milling of iron relay cores. They had only been able to turn out 120 cores per hour using straight cutting oil.
When we installed Cimcool S2 at a 1:20 dilution, the SFPM went from 120 to 330, and the feed increased from 2" per min. to 12" per min. As a result they increased production of the relay cores from 120 per hour to 680 per hour. That's a 466% jump!
In addition, they eliminated a de-greasing operation after milling. The machine was cleaner. Chips didn't stick to it. With Cimcool there was no smoke, no rust, no dermatitis and no rancidity
Bill Wolfenson
Chicago Office



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U. S. Pat. Off.

MEETINGS

(Continued from P. 21)

MARCH

Malleable Founders Society—Technical and Operating conference, Mar. 1-2, Pick-Carter Hotel, Cleveland. Society headquarters, 781 Union Commerce Bldg., Cleveland.

Can Manufacturers Institute, Inc.—Annual & Board meeting, Mar. 6, Waldorf-Astoria, New York. Institute headquarters, 821 15th St., N. W., Washington, D. C.

Steel Founders' Society of America—Annual meeting, Mar. 11-14, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

Industrial Diamond Assn. of America, Inc.—Annual meeting and convention, Mar. 13-17, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters, Box 175, Pompton Plains, N. J.

Society for Non-Destructive Testing — Western regional convention, Mar. 20-24, Ambassador Hotel, Los Angeles. Society headquarters, 1109 Hinman St., Evanston, Ill.

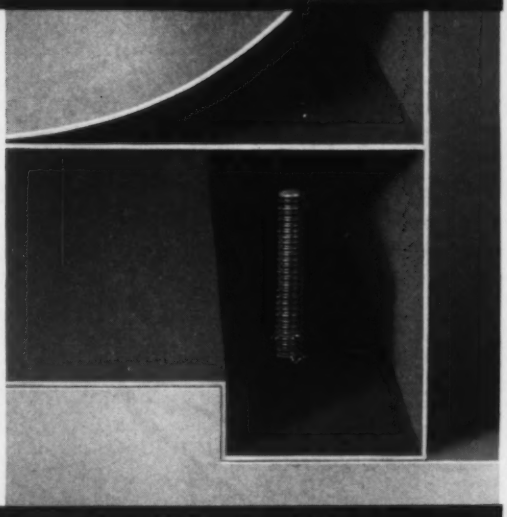
American Hot Dip Galvanizers Assn., Inc.—Annual meeting, Mar. 22-24, The Royal Orleans, New Orleans. Association headquarters, 5225 Manning Place, N. W., Washington, D. C.

Pressed Metal Institute — Spring technical meeting, Mar. 22-24, New York. Institute headquarters, 3673 Lee Rd., Cleveland.

Air Moving and Conditioning Assn., Inc.—Mid-year meeting, Mar. 22-24, Whittier Hotel, Detroit. Association headquarters, 2159 Guardian Bldg., Detroit.

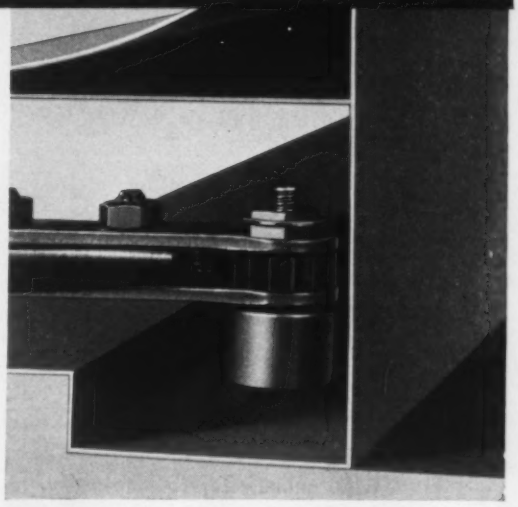
American Machine Tool Distributors Assn.—Spring meeting, Mar. 23-25, Hotel Mark Hopkins, San Francisco. Association headquarters, 1500 Massachusetts Ave., N. W., Washington, D. C.

the most difficult fastening jobs . . .



Running a nut down on a stud is a very simple job, unless the stud is confined in a deep recess where a straight tool can't reach it, and where an angle tool won't provide the necessary clearance for the stud.

. . . can be simplified with APEX Fastening Tools



In this case, you merely put an Apex bolt-clearance type socket, designed for use with ratchet wrenches, on the tool, and you'll find you're right back to a very simple nut running job.

That's the way it goes with the difficult fastening jobs . . . Nearly all applications can be handled easily and economically with one of the more than 5,000 stock types and sizes of Apex Nut Running Tools. And for those few unusual applications, "we quote promptly on specials."

If you fasten anything with nuts, bolts or screws, write, on your company letterhead please, for **CATALOG 30-A** Nut Running Tools, 1/4" to 5/8" square, hex drives. **CATALOG 30-B** Nut Running Tools, 3/4" to 3 1/2" square, hex drives. **CATALOG 30-C** Screwdriving Tools.

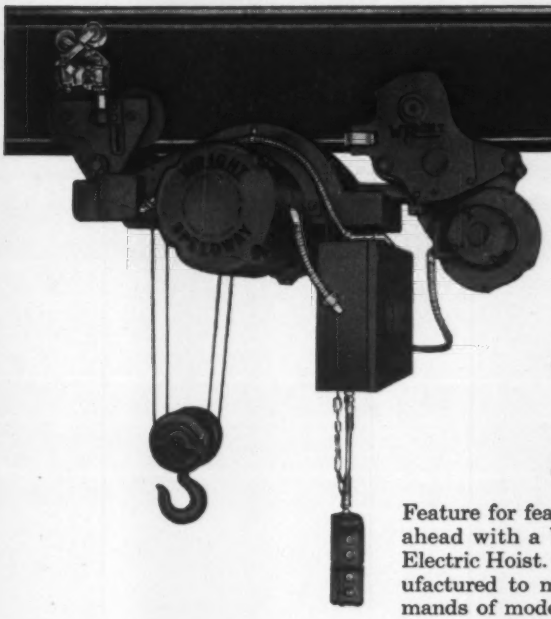
SCREWDRIVING • NUT RUNNING • SPECIAL

Hot tip for steelmakers – *Use Vancoram Columbium Alloys!*

Different effects are obtained in various types of steels through the use of columbium alloys. For instance, in stainless and heat-resistant steels, columbium serves principally as a carbide stabilizer and prevents intergranular corrosion. Small additions to low-alloy and carbon steels reduce grain size and increase strength. And in Type 430 steels it prevents the rolling defect known as "roping."

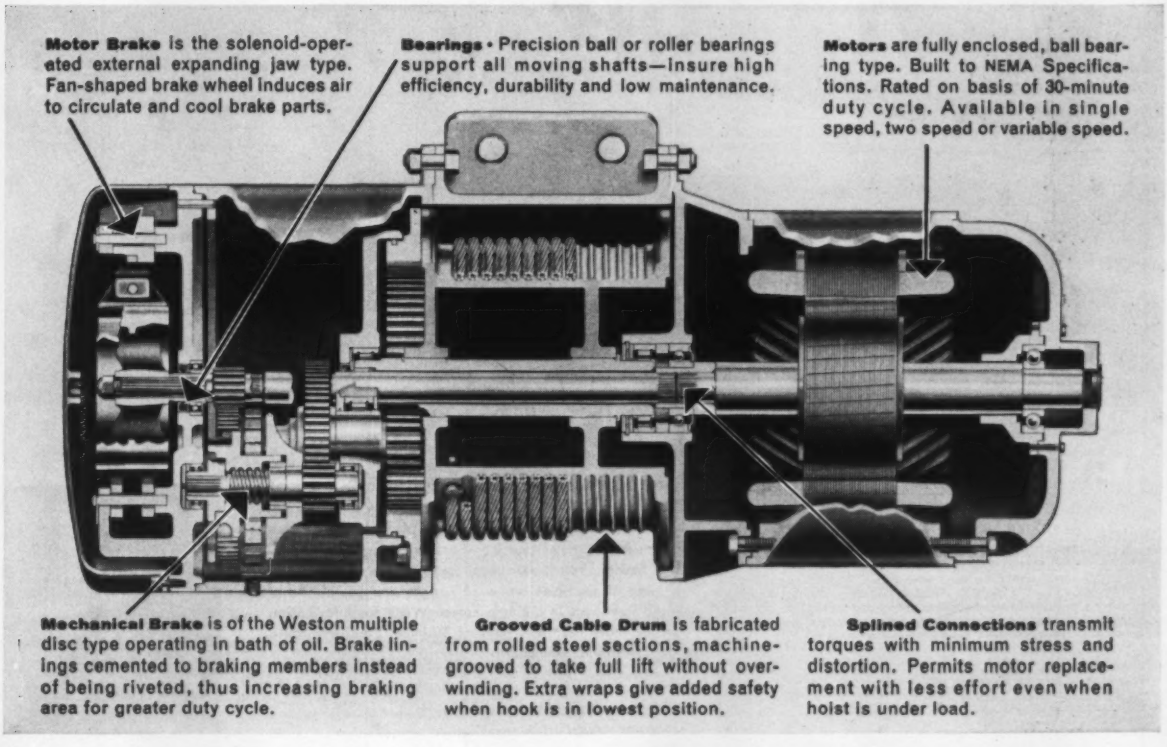
VCA produces columbium alloys in two forms: regular Ferrocolumbium and Thermocol® Exothermic Ferrocolumbium. Thermocol cuts production costs through its high recovery rate (generally in excess of 90%) and through reduced furnace time. It permits large additions of alloy with minimum heat loss and without contact between alloy and furnace slag. See your VCA representative or write for descriptive literature. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, New York · Chicago · Cleveland · Detroit · Pittsburgh

VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals



You Can't Buy a Low-Priced Hoist with the Outstanding Performance and Maintenance Features You Get as Standard Equipment from Wright

Feature for feature, you are years ahead with a WRIGHT *Speedway* Electric Hoist. Designed and manufactured to meet the varied demands of modern high speed production, *Speedway* Hoists give you the safety, adaptability, ruggedness and efficiency which you can't get in a low-priced hoist. Many of these performance and maintenance features are exclusive with WRIGHT. So if you are considering the purchase of an electric hoist, it will pay you to investigate the advantages of WRIGHT *Speedway* Hoists. For complete information, write our York, Pa., headquarters for **Catalog E-58.**


Motor Brake is the solenoid-operated external expanding jaw type. Fan-shaped brake wheel induces air to circulate and cool brake parts.
Bearings • Precision ball or roller bearings support all moving shafts—insure high efficiency, durability and low maintenance.
Motors are fully enclosed, ball bearing type. Built to NEMA Specifications. Rated on basis of 30-minute duty cycle. Available in single speed, two speed or variable speed.
Mechanical Brake is of the Weston multiple disc type operating in bath of oil. Brake linings cemented to braking members instead of being riveted, thus increasing braking area for greater duty cycle.
Grooved Cable Drum is fabricated from rolled steel sections, machine-grooved to take full lift without overwinding. Extra wraps give added safety when hook is in lowest position.
Splined Connections transmit torques with minimum stress and distortion. Permits motor replacement with less effort even when hoist is under load.

See your WRIGHT Distributor *about the Speedway Electric Hoist line in the ¼ to 10-ton capacity range*

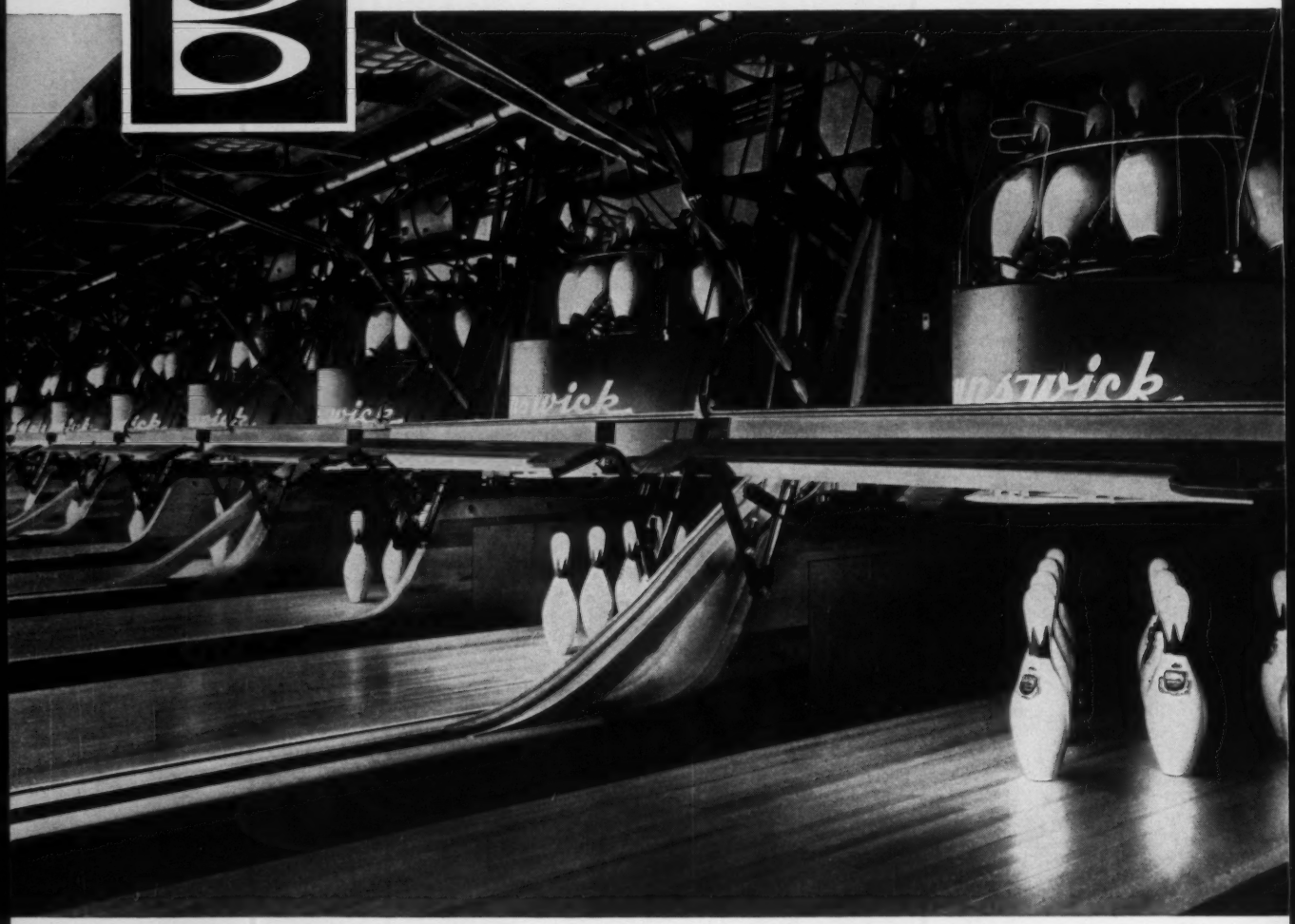
WRIGHT HOISTS

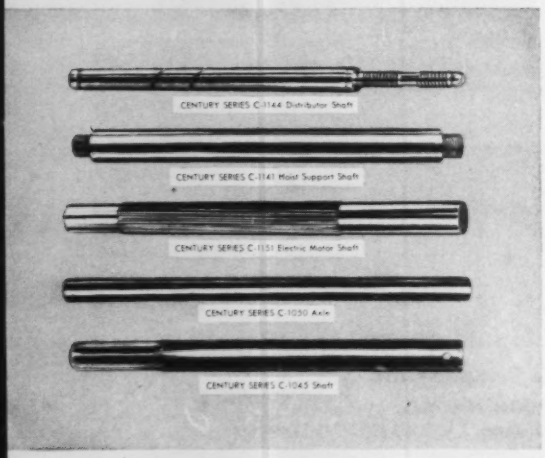
Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

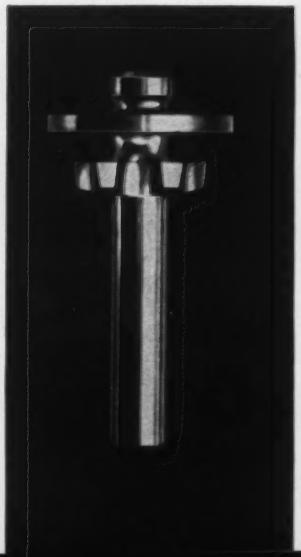
Brunswick CORPORATION puts "Mechanical Brain" to work




CENTURY SERIES C-1144 Distributor Shaft
CENTURY SERIES C-1141 Hoist Support Shaft
CENTURY SERIES C-1151 Electric Motor Shaft
CENTURY SERIES C-1050 Axle
CENTURY SERIES C-1045 Shaft

HIGH MACHINABILITY is the reason Republic ENDURO® Stainless Steel, Type 303, was selected by the National Acme Company in producing one-piece Hyseal Valve Stems for the new American-Standard single-lever mixing faucet. Ten operations, including a multiple end drilling of six holes on a 15° angle are performed in just 12 seconds in a single setup. Write for information on the more than 40 types of Stainless Steel available from Republic. Use coupon.

SPECIFY DEGREE OF MACHINABILITY. Select from Republic's CENTURY SERIES of high strength, stress-relieved, cold finished steel bars. Five grades: C-1045, C-1050, C-1151, C-1141, and C-1144. Each offers minimum yield strength of 100,000 psi. For parts needing little machining, better strength-to-toughness ratios are often obtained with one of the less expensive, lower sulphur grades. Send for your free copy of Republic's CENTURY SERIES Booklet.



with ELECTRUNITE Mechanical Tubing

Better bowling by Brunswick. Better automatic pinsetting with ELECTRUNITE. That's the story behind today's most popular participation sport—bowling for the entire family.

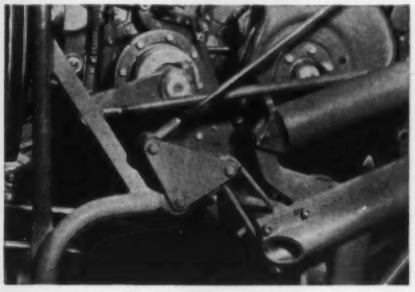
The Automatic Pinsetter, designed and produced by the Brunswick Corporation, Bowling Division, Chicago, Illinois, is a precision engineered, rugged, mechanical unit designed to set pins, sweep away "deadwood" and reset remaining pins, all in the matter of seconds, automatically.

Republic ELECTRUNITE Mechanical Tubing was specified because it met the extreme tolerance requirements with a substantial savings in weight. No sacrifice in strength. High quality ELECTRUNITE is delivered ready for fabricating. Excess manufacturing costs squeezed out.

Republic, world's largest producer of specialty welded tubing, offers ELECTRUNITE in a wide range of sizes, gages, and wall thicknesses, supported by technical and metallurgical assistance. Prompt price and delivery quotations usually within twenty-four hours. Call your Republic representative. Or, write direct. Use coupon below.

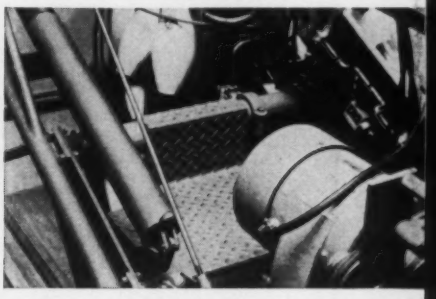
In just 12 seconds, the Brunswick "Magic Brain" sets up the alley for the next shot. The ball takes an elevator ride on ELECTRUNITE Mechanical Tubing to start the return trip to the bowler.

When the ball hits the hinged pit cushion the motion is mechanically transferred to trigger the machine cycle. ELECTRUNITE Mechanical Tubing is used for the pit cushion support arms construction.

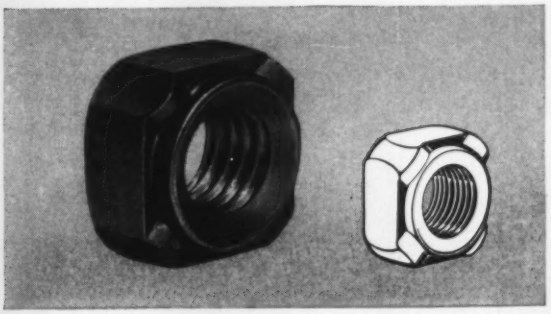


ELECTRUNITE Tubing in three key locations assures smooth, trouble-free lifting, sweeping, Automatic Pinsetter operation. ELECTRUNITE is delivered ready for fabricating, saving production time and costs.

ELECTRUNITE was specified by Brunswick because it meets the extreme tolerance requirements, eliminating the need for any additional machining operations.



REPUBLIC MIDLAND WELD NUT is the newest addition to the more than 20,000 different types and sizes of Republic Fasteners. Republic Weld Nuts save time and money, solve difficult design and assembly problems. Applied quickly and easily by any standard projection welding machine of proper capacity. Fast, accurate positioning. Positive weld. Sure holding power. Ideal for the fabrication fastening, or assembly of metal parts. Write for additional data.



REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL — Strong, Modern, Dependable — Steel

REPUBLIC STEEL CORPORATION
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1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

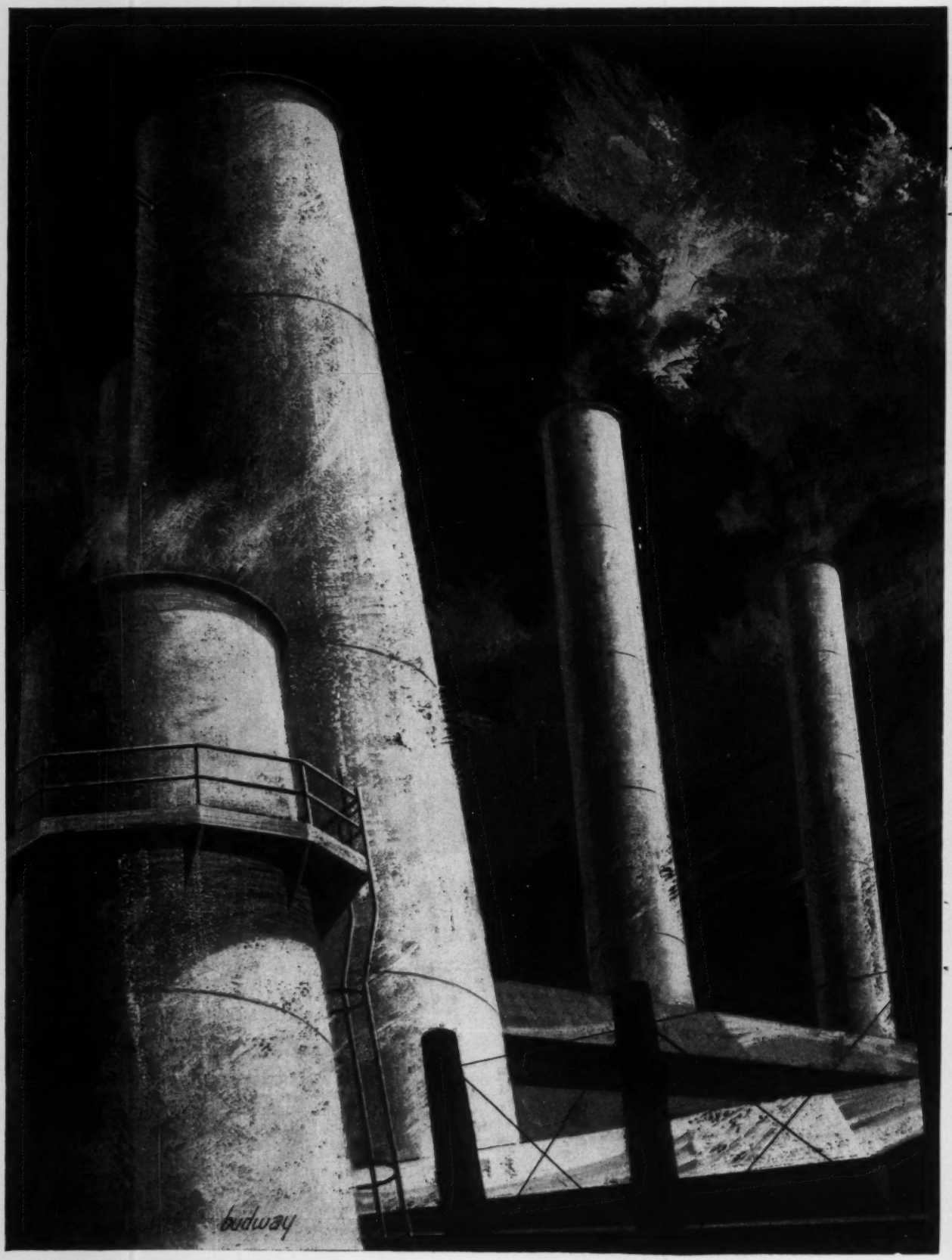
- ☐ ELECTRUNITE® Mechanical Tubing
- ☐ Republic Midland Weld Nuts
- ☐ Republic ENDURO® Stainless Steel
- ☐ CENTURY SERIES Booklet

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____


budway

Did you know there is a guaranteed way to clean stack gases?

Cleaning your gases is not a simple task. A careful analysis must be made of flue gas temperature, dust composition, and such things as dust loadings and gas volume. It takes a real crew of experts to make sense out of the data, then design, manufacture, and install equipment with *guaranteed* gas-cleaning efficiency.

Koppers has over 50 years of industrial gas-cleaning experience. They're experts. Koppers designed and installed the first successful electrostatic precipitators for hot metal open hearth furnaces.

Two Koppers divisions work cooperatively to provide effective gas-cleaning installations. The Engineering and Construction Division can design and install a gas-cleaning system which will eliminate fumes, acid mist, ashes, or dust, as well as recover valuable materials at low cost per cubic foot of gas processed. Precipitators made by the Metal Products Division can be used with any steelmaking or ironmaking furnace, and they operate at close to 100% efficiency, with very little maintenance required.

Two outstanding examples of Koppers installations are the open hearth furnaces at Fairless Works of United States Steel Corporation, and the blast furnaces at Great Lakes Steel Division of National Steel Corporation. A completely different system was designed and installed by Koppers for the McLouth Steel Corporation. Here, they used pressure-type disintegrators to clean gases from electric furnaces and new oxygen converters. It proved efficient for both steelmaking processes. And Koppers is now installing seven additional electrostatic precipitators and ten additional waste heat boilers to control the gas discharge from open hearth furnaces at the Pittsburgh Works of Jones & Laughlin Steel Corporation.

Koppers will be glad to analyze your operation, too. Write to Koppers Company, Inc., Engineering and Construction Division, Pittsburgh 19, Pennsylvania.

KOPPERS ENGINEERING and CONSTRUCTION

Your final steel cost must include both

What goes into *final* cost of steel? Maybe more than you realize. After you know the initial price, figure the further costs of possession. Often hidden and unnecessary, they include the costs of storing, handling and readying your steel for use. Costs your steel service center can often help you reduce or eliminate—to keep your steel costs *low*.

Each steel user's case is different. Ask your steel service center to help you determine the most economical way to buy steel. They will give you a helpful guide for figuring all your costs of possession, such as:

Cost of capital:	Cost of operation:	Other costs:
Inventory	Space	Obsolescence
Space	Material handling	Insurance
Equipment	Cutting & burning	Taxes
	Scrap & wastage	Accounting

Call your nearby steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

STEEL SERVICE CENTER INSTITUTE

...YOUR STEEL SERVICE CENTER

Steel

STEEL SERVICE CENTER INSTITUTE
540-A Terminal Tower, Cleveland 13, Ohio

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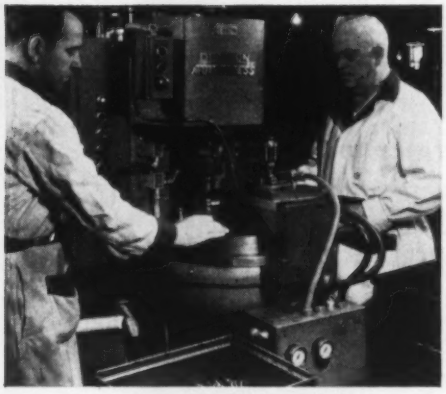
DENISON HydrOILics

How **STEWART-WARNER** produces 220 different assemblies on one **DENISON** Multipress and saves...

MONEY



THIS NEW SERIES "R" MULTIPRESS *assembles 220 different assemblies and prepares them for brazing at Stewart-Warner Corp., Chicago. Write for free Bulletin 324—New "R-S-T" Series Multipress.*

COST-SAVING versatility was a key requirement on this pressing job. To produce assemblies for a new product line, Stewart-Warner's Alemite Division needed a press set-up that could handle up to 220 different assemblies. And because of the short runs involved, fast changeover with minimum downtime was a must. *Installation of just one Denison hydraulic Multipress filled the bill.*

This Denison Series "R" 6-ton bench press, equipped with automatic index table and special "quick-change" tooling, assembles from 600 to 850 assemblies per hour. Finished parts are uniform, high-quality . . . *no rejects.* And tooling changes can be made in minutes to accommodate the full range of 220 different types and sizes.

A unique feature of this operation is an adjustable applicator mounted on the index table that automatically applies a metered amount of brazing compound to each two-piece assembly. It completely eliminates a former hand operation—*and does the job better.*

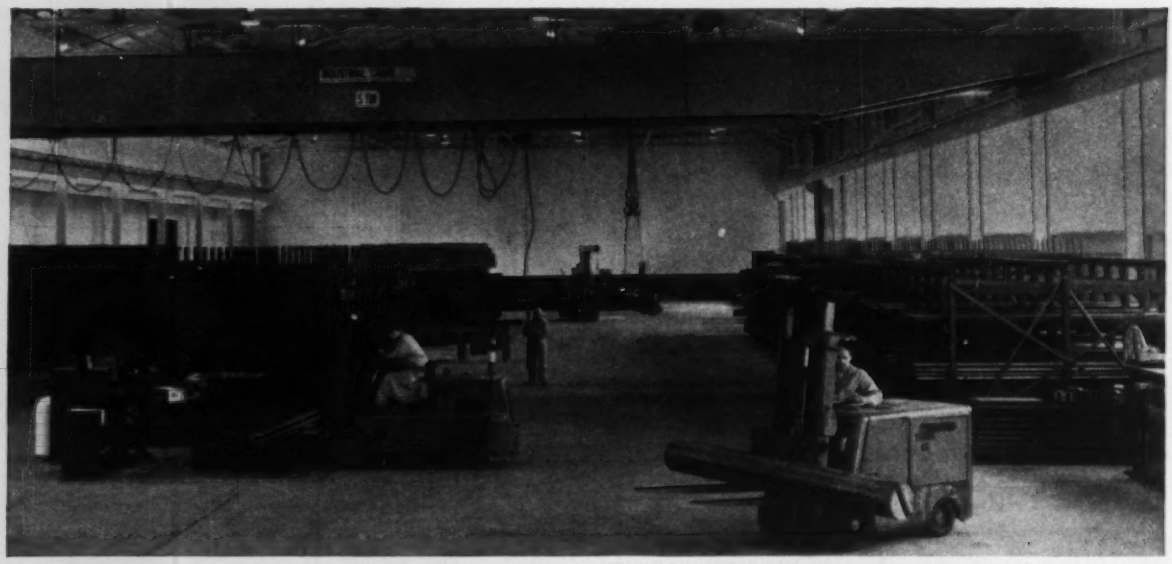
What's *your* problem? Ask the nearby Denison Production Specialist about a **M**ultipress **A**nalysis **P**rogram in your plant now. It can **MAP** new ways to cut your costs, get better quality finished products.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1242 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS

How Timken® Steel from helps you keep production



PROMPT DELIVERY. You get fast dependable delivery of steel products from your Steel Service Center. It helps you keep production on schedule, meet emergencies. Steel Service Centers are equipped to prepare steel to size required, ready for use, cutting your processing cost. And when it's Timken® seamless steel tubing, graphitic tool steels, alloy steel bars or billets, you can be sure it's the finest steel made.

EXPERT TECHNICAL SERVICE. Your Steel Service Center representatives are experienced, trained to help on your steel applications. And when you buy Timken steel, help is also yours from Timken Company experts—specialists in fine alloy steel for over 40 years. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

CUTS YOUR INVENTORY COST, RELEASES SPACE. Your Steel Service Center stocks a wide variety of steel products. Result—you can reduce your inventory costs, put inventory capital to work elsewhere. And you can release storage space for more productive work.

TIMKEN® *Fine Alloy* STEEL

your Steel Service Center schedules, cut costs

FOR FAST, ABLE SERVICE ON TIMKEN® SEAMLESS STEEL TUBING, GRAPHITIC TOOL STEELS AND ALLOY STEEL BARS CALL THESE STEEL SERVICE CENTERS

LOCATION	STEEL SERVICE CENTER
ALABAMA	
Birmingham	O'Neal Steel, Inc.*†
ARIZONA	
Phoenix	Earle M. Jorgensen Co.*†•
CALIFORNIA	
Los Angeles	Allen-Fry Steel Company*
	Baker Steel & Tube Co. •
	Coulter Steel & Forge Co.*†
	Earle M. Jorgensen Co.*†
	Kilsby Tube Supply, Division of Republic Supply Co. of Calif.•
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
	Tube Distributors, California, Inc. •
	Tubesales•
Oakland	Coulter Steel & Forge Company (Emeryville)*†
	Earle M. Jorgensen Co.*†
	Joseph T. Ryerson & Son, Inc.*•
San Francisco	Baker Steel & Tube Co.•
	Earle M. Jorgensen Co.*†
	A. Milne & Co., Inc. (Burlingame)†
COLORADO	
Denver	Earle M. Jorgensen Co.*†•
CONNECTICUT	
Windsor	SAE Steels, Inc.•
GEORGIA	
Atlanta	A. Milne & Co., Inc.†
	O'Neal Steel, Inc.*†
HAWAII	
Honolulu	Earle M. Jorgensen Co.*†•
ILLINOIS	
Chicago	Chicago Tube and Iron Co.•
	Hy-Alloy Steels Co.*•
	A. Milne & Co., Inc. (Melrose Park)†
	The Peninsular Steel Co.†
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
INDIANA	
Ft. Wayne	Tubular Sales•
Indianapolis	The Peninsular Steel Co.†
KANSAS	
Wichita	Earle M. Jorgensen Co.*†•
LOUISIANA	
New Orleans	Earle M. Jorgensen Co.*†•
MASSACHUSETTS	
Boston	A. Milne & Co., Inc.†
	Joseph T. Ryerson & Son, Inc. (Allston)*•
MICHIGAN	
Detroit	Alloy Steels, Incorporated†
	A. Milne & Co., Inc.†
	The Peninsular Steel Co.†
	Joseph T. Ryerson & Son, Inc. •
	Service Steel Division Van Pelt Corp.•
	Tubular Sales•
Grand Rapids	The Peninsular Steel Co.†
MINNESOTA	
St. Paul	Paper, Calmenson & Company*
MISSISSIPPI	
Jackson	O'Neal Steel, Inc.*†
MISSOURI	
St. Louis	Ford Steel Company†
	Joseph T. Ryerson & Son, Inc.*•
NEW JERSEY	
Elizabeth	A. B. Murray Co., Inc.•
Englewood	Tubesales•
Jersey City	Joseph T. Ryerson & Son, Inc.*•
Kenilworth	A. Milne & Co., Inc.†
Linden	Bowsteel Distributors Corporation*
Newark	Faitoute Iron & Steel Company, Inc.*
NEW YORK	
Buffalo	The Peninsular Steel Co. (Tonawanda)†
	Joseph T. Ryerson & Son, Inc.*•
	Service Steel Division Van Pelt Corp.•
Garden City (L.I.)	Tube Distributors Co., Inc.•
New York	A. Milne & Co., Inc.†
NORTH CAROLINA	
Charlotte	Joseph T. Ryerson & Son, Inc. •
OHIO	
Akron	The Peninsular Steel Co.†
Cincinnati	Ford Steel Company†
	Joseph T. Ryerson & Son, Inc. •
	SAE Steels, Inc.*
	Service Steel Division Van Pelt Corp.•
Cleveland	A. Milne & Co., Inc.†
	The Peninsular Steel Co. (Bedford Heights)†
	Joseph T. Ryerson & Son, Inc.*•
	SAE Steels, Inc.*
Dayton	Alloy Steels, Incorporated†
	A. Milne & Co., Inc.†
	The Peninsular Steel Co.†
Toledo	The Peninsular Steel Co.†
OKLAHOMA	
Tulsa	Earle M. Jorgensen Co.*†•
OREGON	
Portland	Pacific Machinery and Tool Steel Co.†
PENNSYLVANIA	
Bristol	A. B. Murray Co., Inc.•
Butler	Keystone Pipe & Supply Co.•
Carnegie	A. Milne & Co., Inc.†
	Joseph T. Ryerson & Son, Inc.*•
McKeesport	A. B. Murray Co., Inc.•
Philadelphia	Capitol Pipe & Steel Products, Inc.•
	A. M[illegible] & Co., Inc.†
	Jose[illegible] T. Ryerson & Son, Inc.*•
TENNESSEE	
Chattanooga	O'Neal Steel, Inc.*†
TEXAS	
Dallas	Earle M. Jorgensen Co.*†•
	Joseph T. Ryerson & Son, Inc.*•
Houston	Earle M. Jorgensen Co.*†•
	Peden Iron & Steel Co.•
	Joseph T. Ryerson & Son, Inc.*•
UTAH	
Salt Lake City	Coulter Steel & Forge Company*†
WASHINGTON	
Seattle	Coulter Steel & Forge Company*†
	Earle M. Jorgensen Co.*†
	Joseph T. Ryerson & Son, Inc.*•
Spokane	Joseph T. Ryerson & Son, Inc.*•
WISCONSIN	
Milwaukee	Joseph T. Ryerson & Son, Inc.*•
CANADA	
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Montreal, Quebec	Drummond, McCall & Co., Limited•
	Vanadium-Alloys Steel Canada, Limited†
Toronto, Ontario	Drummond, McCall & Co., Limited•
	Vanadium-Alloys Steel Canada, Limited†

* Alloy Steel Bars and Billets † Graphitic Tool Steels • Seamless Steel Tubing

How Bob Clark increased

After getting his B.A. at Illinois College, Bay State Abrasive Specialist Robert M. Clark joined U.S. Steel where his work gave him a great deal of highly practical experience in metal-working problems. Since coming to Bay State in 1956, he has been in contact with just about every type of metal-working operation in the Chicago area and he's proven his skill by diagnosing and curing some unusual grinding shop ailments.

Getting a 20% increase in wheel life is a solid bonanza in any grinding operation, but there's more to this Bay State case history than that. It's an excellent example of the way careful analysis of the *whole* abrasive problem can pay *multiple* dividends.

It started with a simple test. Two unmarked Bay State diamond wheels were delivered to Cummins Engine Company, Inc., Columbus, Indiana, for a performance check against two competitors' wheels under standard shop conditions. Fifty-five days later the competition's wheels were completely used up. The Bay State wheels lasted 66 days.

Since both types of wheels had been doing identically the same kind of work . . . and both carried exactly the same price tag . . . the 20% longer life of the Bay State wheels represented a solid cash saving.

On top of this, however, Bay State Abrasive Specialist Bob Clark found that wheels of 1/16" diamond depth could be used on certain jobs instead of the 1/8" depth wheels used in the test with an additional saving of $13,000 a year. And, finally, he worked out a new quantity-ordering system for Cummins that saved a further $1,824.00 annually and also insured against emergency shortages of wheels.

Bob Clark's outstanding thoroughness and demonstrated ability in this case have led to his being asked to survey all of Cummins diamond wheel applications and work out optimum wheel specifications for each job.

Diamond grinding is a highly specialized technique, of course, but even if your grinding operations call only for well-known standard specifications, there's an excellent chance that Bay State can give you improved performance. Why not call in your Bay State distributor or direct factory representative and put him to work? *Better grinding at lower cost . . . that is his business.*

diamond wheel life from 55 to 66 days at Cummins Engine Company, Inc.

▲ Operator Charles Adams prepares to make the first pass on a milling cutter with Bay State diamond cup wheel of ⅛" diamond depth. This is the actual specification that out-performed competing wheels by 20%.

Discussing the advantages of 1/16" diamond thickness wheel for specialized operations are (left to right): John Hedges, Supervisor of Tool Control at Cummins, Bay State Abrasive Specialist Bob Clark and Cummins Abrasive Investigator Robert Elliot. ▶

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

Hot stuff served up on rubber

Improved B.F.Goodrich belt saves customer $5500 in 13 months

THE cargo on that belt was causing plenty of trouble in this zinc plant. It's a highly abrasive sinter mix—still so hot at this point that it used to burn out belts after only 4 months' service.

When a B.F.Goodrich distributor heard about the trouble, he recommended a new kind of conveyor belt, called Solarflex, designed specifically for handling hot materials. This B.F.Goodrich belt is made of special rubber that stays soft and pliable at hot temperatures that cause other belts to harden, crack and finally break down.

At last report, the B.F.Goodrich Solarflex belt had been on the job 13 months. Belt service had tripled. And the customer had saved over $5500 in belt replacements and installation costs.

When you call on a B.F.Goodrich distributor for help with a conveying problem, you can count on getting the kind of belting that will keep things in your plant moving, cut down on repairs, and give you more for your money in terms of long, useful service.

BFG distributors have full information on this hot-material belt. And, as factory-trained specialists in rubber products, they can answer questions about the many products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Department M-954, Akron 18, Ohio.*

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CONVEYOR BELTS

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Strain-Tempered 4145 Leaded is the easiest-to-machine high-strength alloy bar you can buy. Heat treatment and related distortion corrections after machining are eliminated. Tool life is increased. Both material and processing costs are reduced. Strain-Tempered 4145 Leaded is another money-saving development of Bliss & Laughlin research.

Guaranteed Minimums: 150,000 psi tensile strength; 130,000 psi yield strength; 302 Brinell. Approximate minimums: 10% elongation in 2"; 35% reduction in area.

LOWEST COST for highest strength

Strain-Tempered alloys are also produced to other strength levels at savings from $29 to $87 per ton. Grades like 4140 and 5150, for example, can be produced to individual mechanical property specifications such as: 115,000, 125,000 or 145,000 psi minimum tensile strength; 95,000, 105,000 or 125,000 psi minimum yield strength; 217/255, 269/321 or 275/325 Brinell and 27/34 or 28/36 Rockwell "C". Various combinations of severe cold working and special furnace treatment tailor the material to your exact requirements.

PAY ONLY for the grade needed

As in the case of Strain-Tempered Alloy, Strain-Tempered Carbon Bars are available in a variety of grades. You pay only for the grade which meets your machinability needs. These bars offer a unique combination of high strength, long wearability, good ductility and a low level of residual stresses.

Guaranteed Minimum: 100,000 psi yield strength for standard Strain-Tempered C1144.

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A LABORATORY IN JOHANNESBURG IS WORKING FOR YOU

Possibly you have never even heard of the Diamond Research Laboratory of Johannesburg. Yet its findings are of great importance to every user of industrial diamonds.

Established in 1947, the Diamond Research Laboratory is sponsored by Industrial Distributors (1946) Ltd. Its work is devoted exclusively to investigations on all phases of the diamond.

In its brief 13 years of existence, the Laboratory's developments have been of great significance. They include:

- increase in efficiency of natural diamond grit in resin and metal-bond grinding wheels
- considerable improvement in design and performance of diamond drill crowns
- development of electrolytic method of resharpening tungsten-carbide-tipped percussion drill bits
- development of diamond thermistors for highly accurate temperature measurements
- vector orientation, by X-ray, of diamond tool stones

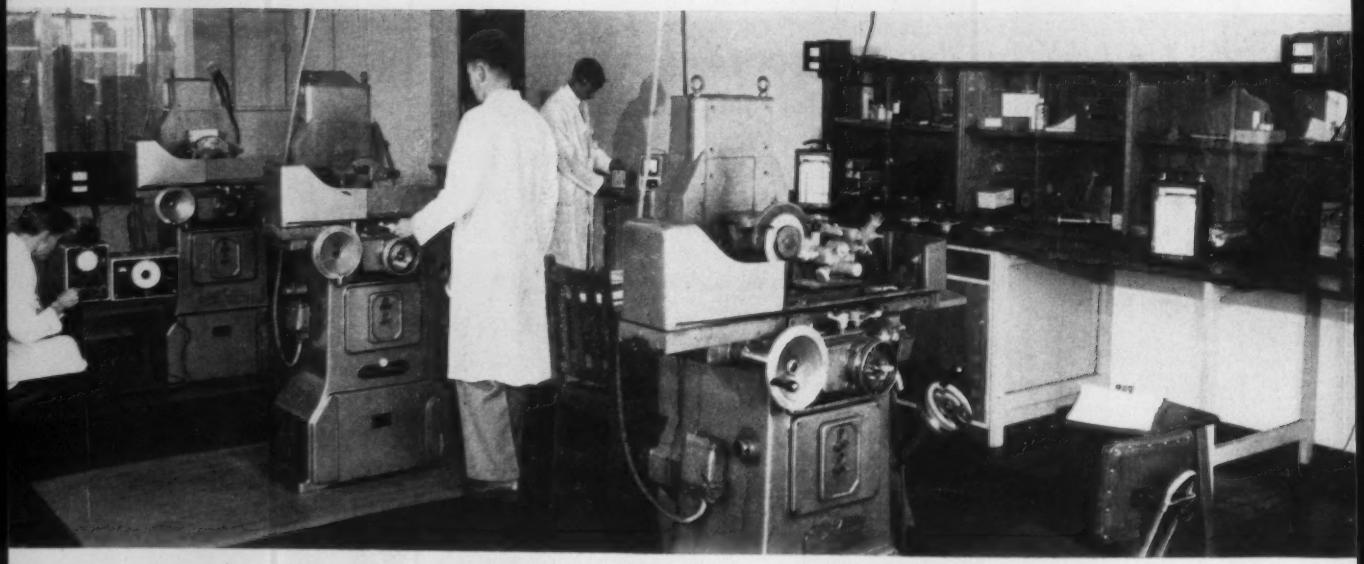
Obviously, this intensive—and costly—research cannot be carried on by individual users of industrial diamonds. But Industrial Distributors, world distributors of natural industrial diamonds, has undertaken this responsibility for interested users throughout the world.

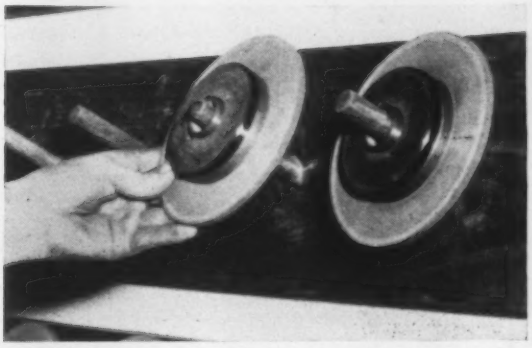
The Diamond Research Laboratory is in Johannesburg. But it's working for *you*.

INDUSTRIAL DISTRIBUTORS (SALES), LTD., LONDON

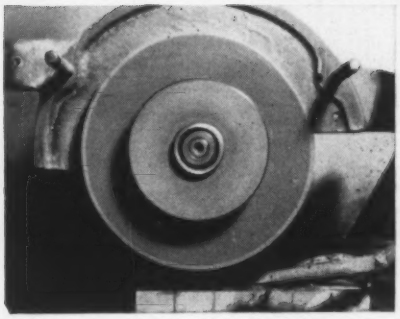
INDUSTRIAL DIAMONDS CUT PRACTICALLY EVERYTHING . . . ESPECIALLY YOUR PRODUCTION COSTS

Resin-bonded diamond grinding wheels are tested in a carefully controlled experiment. In two years of testing, 450 separate wheels were used to grind away two tons of carbide.



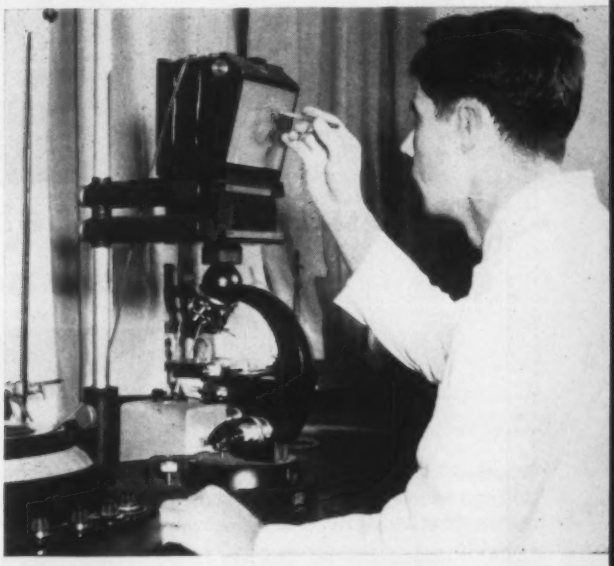


A specially developed type of grit enables resin-bond diamond wheels to grind rapidly and efficiently.

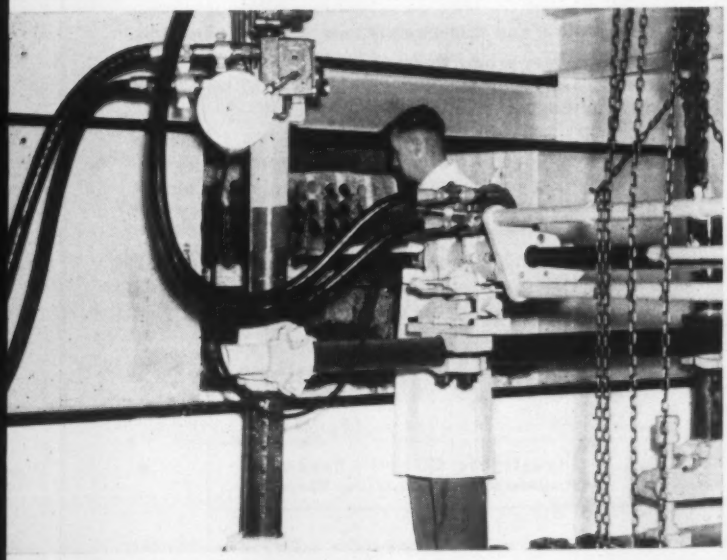


A diamond abrasive wheel is tested at the Diamond Research Laboratory by surface grinding a block of tungsten carbide.

Staff member counts number of diamond grit particles which appear on the screen of a microscope. This instrument was especially developed for checking the shape of diamond grit.



Laboratory drilling machine tests the efficiency of diamond drill crowns in granite.



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in the Laboratory's work, please fill in this coupon. You will receive a copy of this attractive booklet outlining the function and the findings of the Diamond Research Laboratory.

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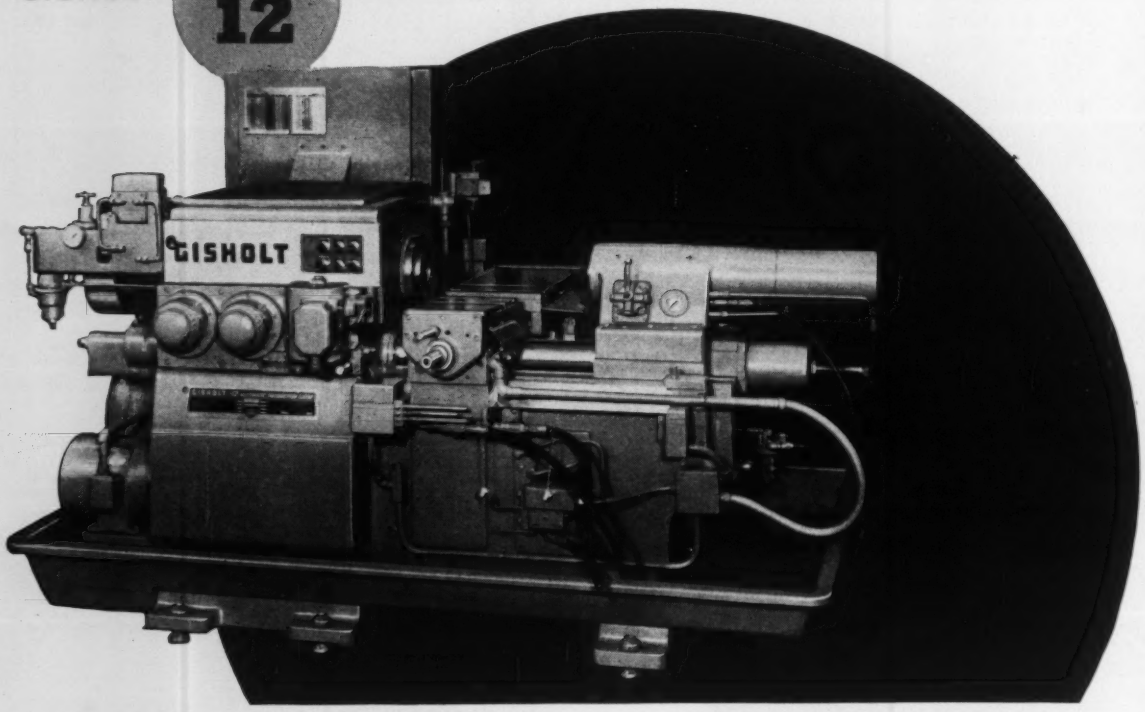
GISHOLT NUMBER 12 AUTOMATIC CHUCKING LATHE



Unequaled in its size range, in versatility, speed and low-cost production

Whether it's for continuous operation in mass production or a wide variety of parts in small lots, this machine is in a class by itself.

Faster automatic cycle. The No. 12 is a fully automatic chucking lathe, capable of performing all types of machining operations in rapid sequence. With 420 spindle speeds ranging from 40 to 2600 r.p.m. and an infinite selection of feeds, it meets every requirement for stock removal, finish and minimum f.t.f. time.

Complete range of accessories. Front, rear, auxiliary and overhead slides can be applied; angular cuts are easily made; JETracer of single- or multiple-pass types can be used. Automation can be incorporated—from simple loading and unloading to gaging and sorting of finished pieces.

Greater power and rigidity. Here, too, is the power (up to 40 h.p.) with rigidity to take full advantage of the newest tooling and the heaviest cuts without vibration.

Boosts operator productivity. It requires a minimum of operator skill and attention—allows him to handle additional machines.

With all its speed and ruggedness, the No. 12 has the extreme flexibility of motions to handle practically any machining job on parts up to 16½" in diameter. It delivers high production with consistent accuracy and less dependence than ever on operator skill.

Ask your Gisholt Representative or write for Bulletin 1213, just off the press.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

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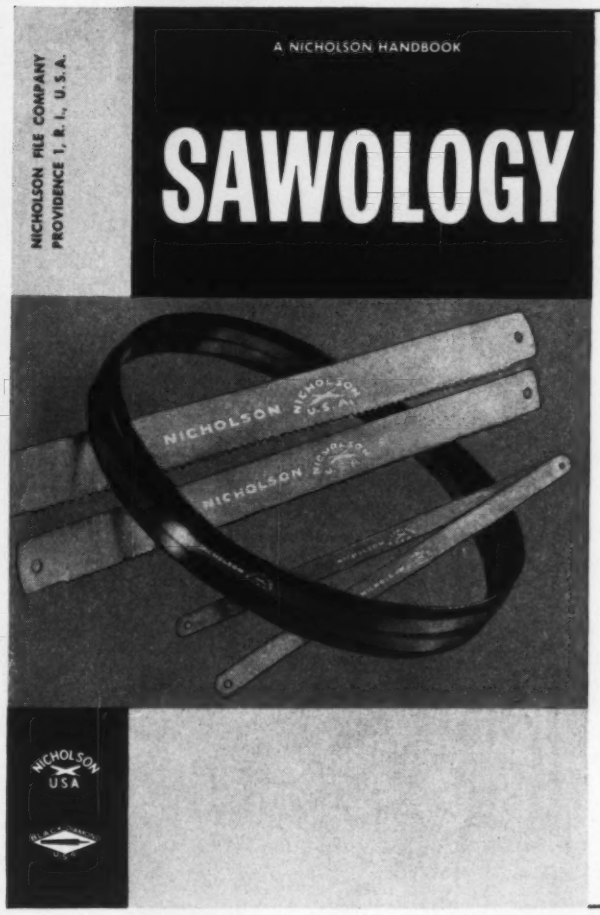

Sawology

— being a brief account of the History, Manufacture, Variety and Uses of saws for the cutting of ferrous and non-ferrous metals, hard plastics and rubber, wood, and other dense materials . . . A useful handbook and guide for the shop superintendent, production foreman, mechanic, or home craftsman.

CONTENTS

Foreword	3
The "Genealogy" of Saws	4
The Making of Metal-Cutting Saw Blades	6
HAND HACKSAW BLADES	8
Hand Hacksaw Tooth Selector	10
Six Blade Types	10
How to Get the Most out of Hand Hacksaw Blades	12
Hints on Use and Care	14
POWER HACKSAW BLADES	15
Power Hacksaw Tooth Selector	16
Four Blade Types	16
Hints on Use and Care	18
BAND SAW BLADES	19
Four Blade Types	20
Friction Sawing	21
Contour Sawing	22
Hints on Use and Care	25
Band Saw Blade and Tooth Selectors	26
Notes and Quotes on Band Sawing	28
Questions and Answers	31

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34-PAGE HANDBOOK ON METAL CUTTING BLADES

Written especially for Nicholson. Draws on all our facilities, skills and experience with metal separating jobs and appropriate tools. This is one of the first books of its kind dealing with the manufacture, proper selection and effective use of saws for cutting ferrous and nonferrous metals, hard plastics and rubber, wood, other dense materials.

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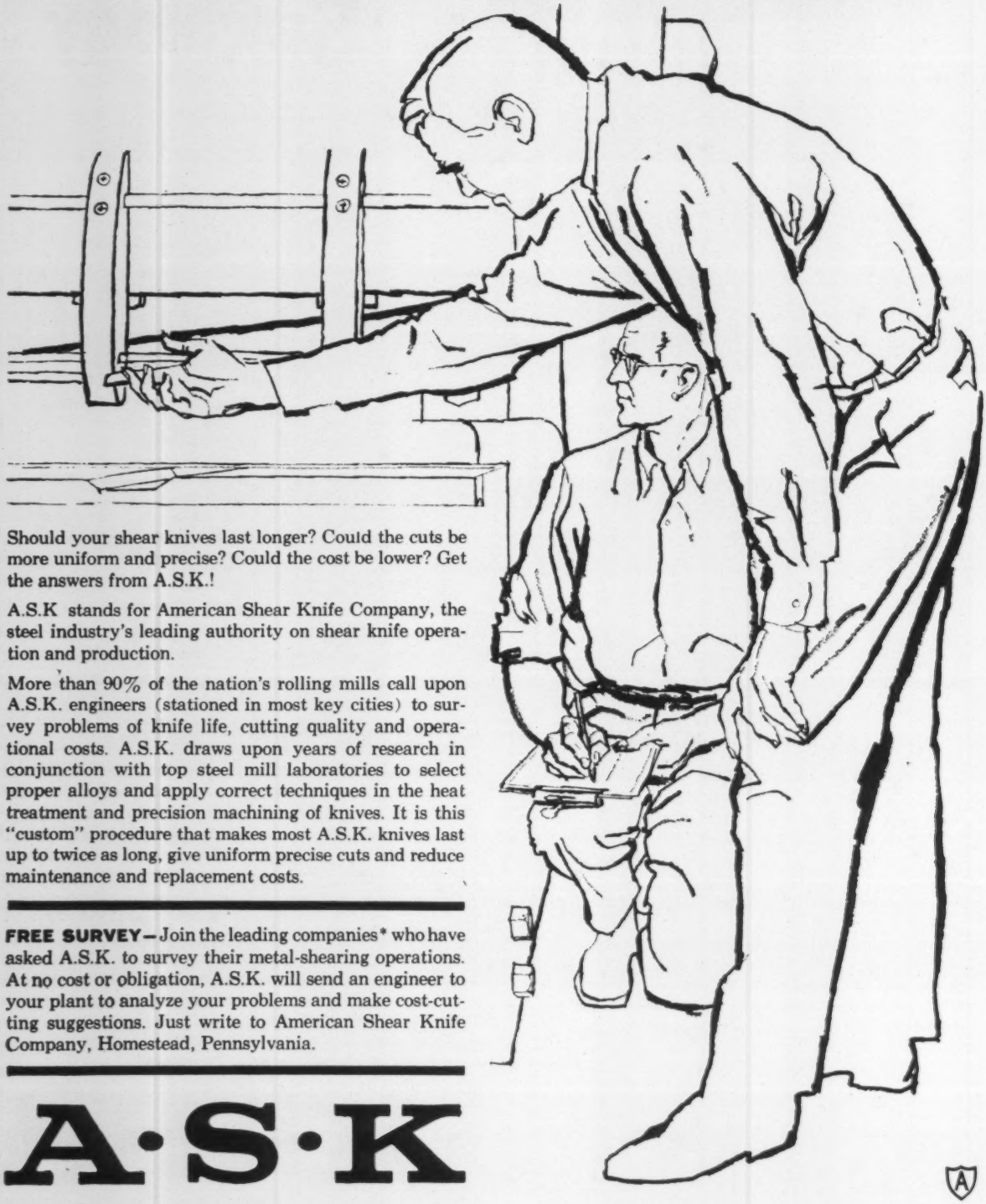
Can you get more wear from your shear knives?

A·S·K for the answer!



Should your shear knives last longer? Could the cuts be more uniform and precise? Could the cost be lower? Get the answers from A.S.K.!

A.S.K stands for American Shear Knife Company, the steel industry's leading authority on shear knife operation and production.

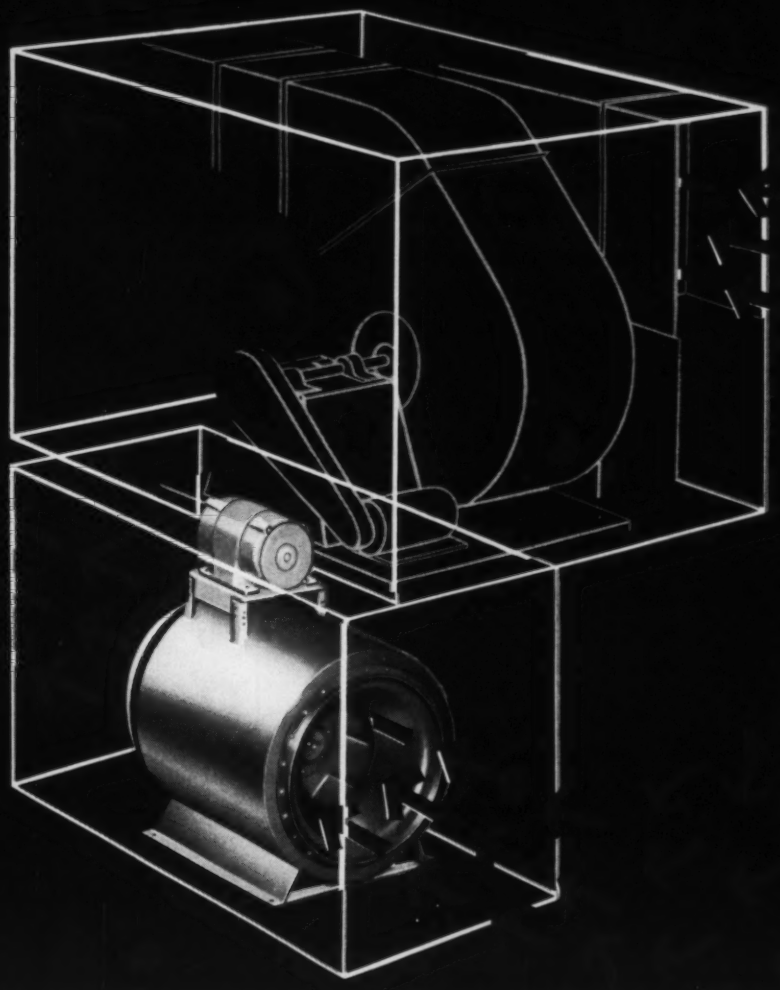
More than 90% of the nation's rolling mills call upon A.S.K. engineers (stationed in most key cities) to survey problems of knife life, cutting quality and operational costs. A.S.K. draws upon years of research in conjunction with top steel mill laboratories to select proper alloys and apply correct techniques in the heat treatment and precision machining of knives. It is this "custom" procedure that makes most A.S.K. knives last up to twice as long, give uniform precise cuts and reduce maintenance and replacement costs.

FREE SURVEY—Join the leading companies* who have asked A.S.K. to survey their metal-shearing operations. At no cost or obligation, A.S.K. will send an engineer to your plant to analyze your problems and make cost-cutting suggestions. Just write to American Shear Knife Company, Homestead, Pennsylvania.

A·S·K

AMERICAN SHEAR KNIFE

**names supplied on request*



Save space with the new in-line CENTRILINE fan!

Now from Westinghouse, a totally new type of fan...the in-line, Airfoil, centrifugal CENTRILINE® . . . gives you the Airfoil centrifugal fan performance of conventional fans in less than half the installed space.

The in-line air flow of CENTRILINE lets you save space by using in-line duct-work. Inlet and outlet dimensions are identical. You can hang CENTRILINE fans from ceilings, stack them, mount them on walls, as well as on floors and platforms.

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CENTRILINE fans also insure quiet operation. Secret is a Westinghouse exclusive: the Airfoil-bladed centrifugal wheel. Save space, cut installation costs and reduce noise with CENTRILINE, for both commercial and industrial installations. Ask your consulting engineer. Mail coupon for detailed catalog. J-80715

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Now! A new rugged line of versatile foot switches from Cutler-Hammer

Smartly styled . . . four types . . . designed to be used many different ways

Now you can get the same high quality in foot switches you find in Cutler-Hammer motor starters.

Our new foot switches are designed to be stepped on, kneed, elbowed, palmed or whatever method you can think of to use them. Heavy gauge metal and rugged construction will keep these switches operating long after others have failed.

You get versatility, too. The heavy duty, side treadle switch has three interchangeable operating arrangements that can be made easily in the field by just changing the position of a nylon cam, and all are styled alike to give you uniformity in appearance.

Be sure to get full details from your Cutler-Hammer distributor and send for Pub. LO-91-D246.

What's new at Cutler-Hammer?
We've geared up for the great growth of technology coming in this decade . . . with new, better products like the foot switches, new engineering talent, new plant facilities. If you're planning ahead, let's get together. Maybe we could help you with your electrical control and automation plans. Get in touch with the Cutler-Hammer Sales Office nearest you.

WHAT'S NEW? ASK...

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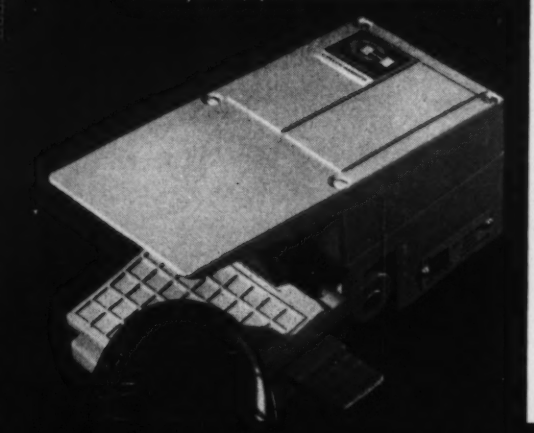
HEAVY DUTY SIDE TREADLE OPERATED FOOT SWITCH

Most versatile foot switch you've ever seen. Just by changing the position of a nylon cam, you can change the operation of the switch on the job. Comes with four nameplates (Start, Stop, Forward and Reverse). Pick the two you want, toss the other two.

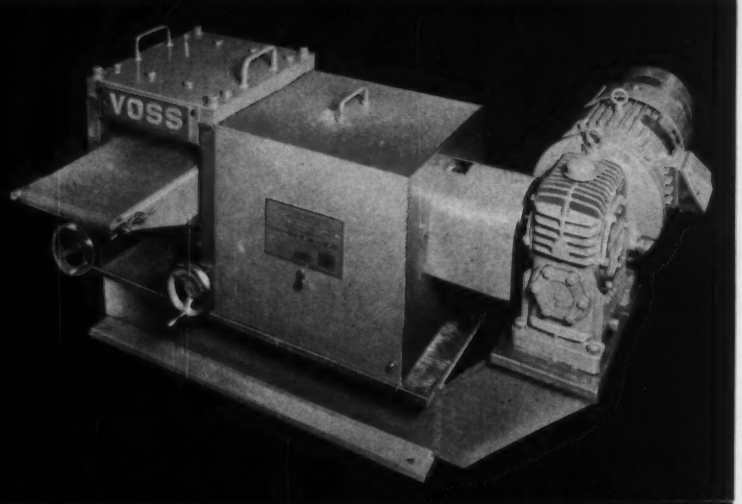
HEAVY DUTY TREADLE SWITCH WITH FOOT LOCK Non-slip tread helps keep operator's foot from slipping. Available with several types of guards. Locks when depressed, opens when red release is touched.



HEAVY DUTY PALM-TYPE SWITCH Big orange surface easy to see. Rated for 600 volts maximum. Neoprene gasket stays flexible, resists effects of oil.

STANDARD DUTY TREADLE-OPERATED FOOT SWITCH Use it for a knee operation. Has a rating of 600 volts maximum. Three mounting bosses permit mounting on uneven surfaces without rocking.

SPECIAL REPORT



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Bold statement? Yes! True? Yes! In some of its present applications, two Voss flatteners and a few operators have replaced hundreds of workers assigned to hand flattening.

Principles of Voss Roller Leveler Applied—An adaptation of the Voss precision Roller Leveler, considered the Cadillac of its class, the flattener operation is based on a series of small diameter work rolls supported by multiple back-up bearings. Parts are worked to relieve stresses, achieving within .005 of dead flatness in one pass.

Reliability Built In—One of the important characteristics of the Voss Roller Leveler is its reliability and minimum downtime. The flattener shares these qualities. Rugged construction of the machine insures a long and productive life.

Hand Feed or Automatic
The flattener is available either way. Most models are compact enough to sit on a desk top. The machine will handle an extremely wide variety of flat stamped parts. It can also be engineered to flatten parts having irregular surfaces.

Let Voss help you to automate your parts-flattening. Call or write today.

We'll be glad to arrange a demonstration with your parts, without obligation.

Voss ENGINEERING CO.

7301 Penn Ave. Pittsburgh 8, Pa. Churchill 2-4422

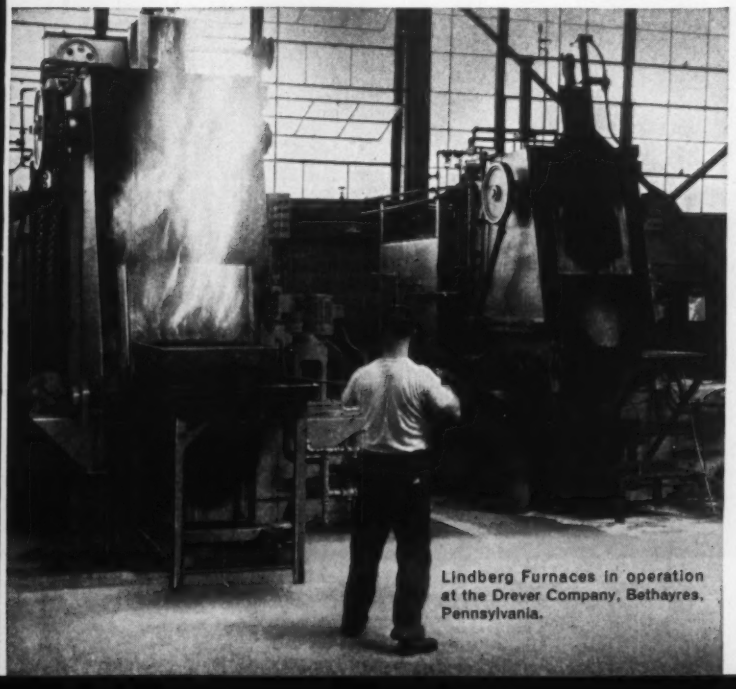
What HORACE DREVER has to say about Lindberg heat treating equipment

Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

QUOTE from Mr. Drever's unsolicited letter to Lindberg Engineering Company

"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

DREVER COMPANY



Lindberg Furnaces in operation at the Drever Company, Bethayres, Pennsylvania.

We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

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Depend on Yale Air Hoists for the toughest jobs!

Resist heat—give you accurate inching control

Yale Air Hoists respond instantly to throttle action. They run at top speed or creep with inching precision. Lightweight handle gives you safe one hand control. Totally enclosed rotary van type motor is explosion-proof . . . cannot burn out . . . will not overheat. Load will not drop through air failure. Choose link or roller chain models. ¼, ½ and 1 ton capacity. Wide range of trolley models to increase flexibility of use.

For every job that requires lifting, Yale designs a hoist to carry the load efficiently. Each hoist is built to take punishment under toughest operating conditions, due to quality of design and precision workmanship. Only minimum maintenance will be required. Powered by air, electricity or hand, each represents the soundest investment you can make in hoisting equipment. Distributors from coast to coast. See your Yellow Pages or write us. Yale Materials Handling Division, Dept. A-101, Philadelphia 15, Pa., a Division of The Yale & Towne Manufacturing Company.

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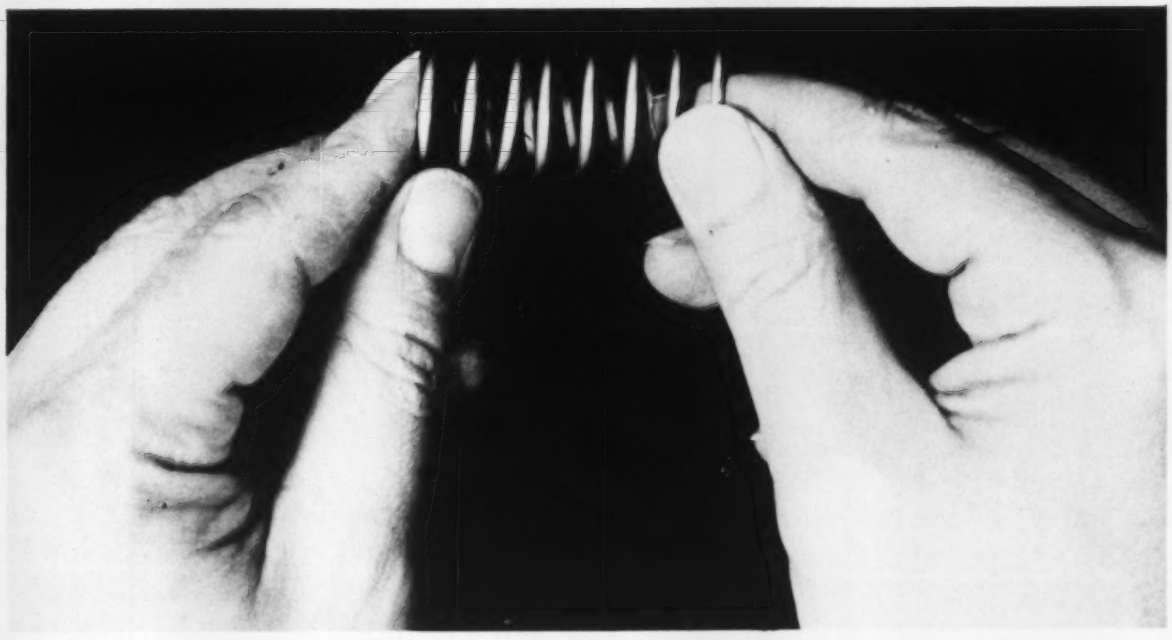
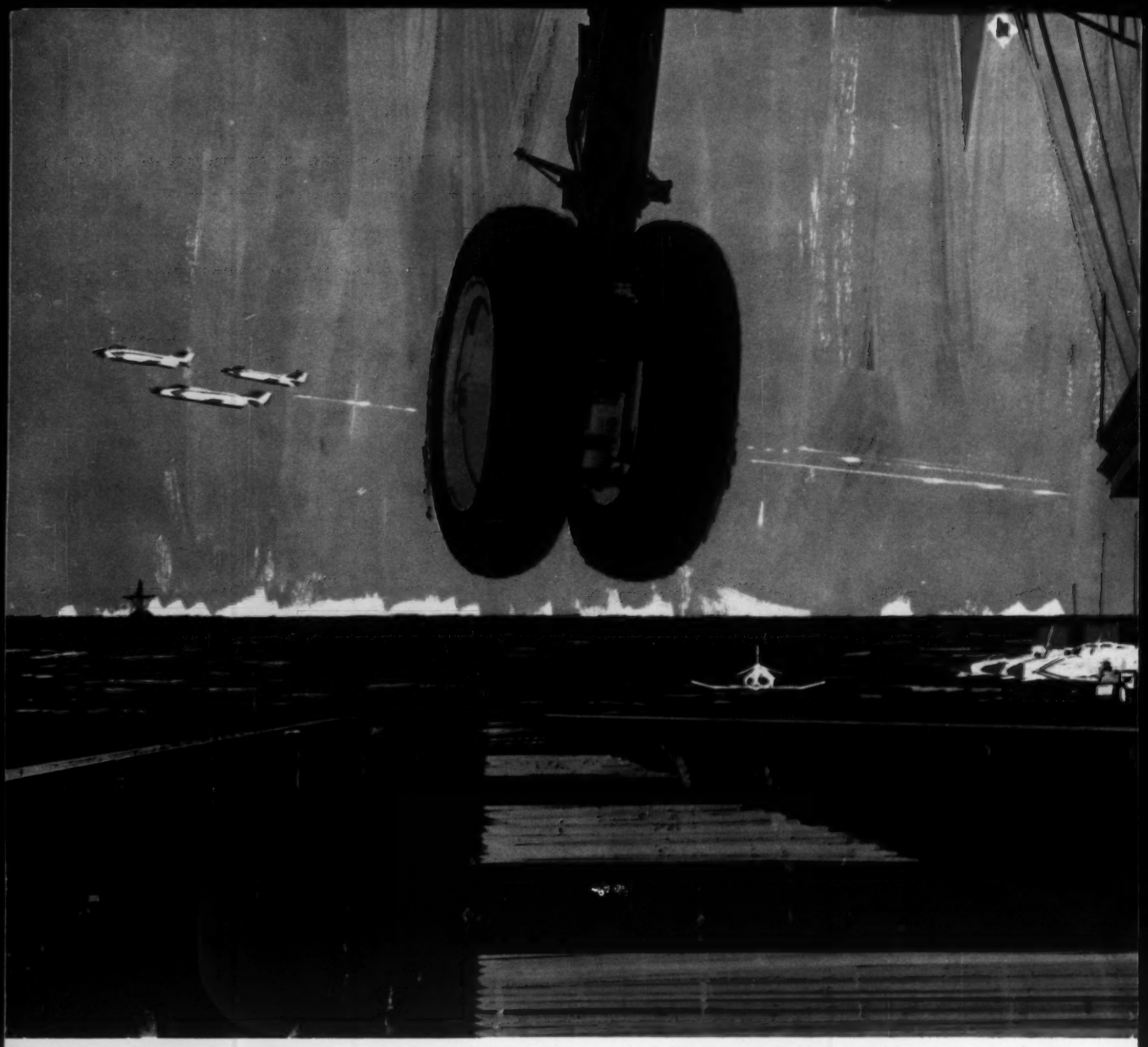


MUSIC WIRE . . . STAINLESS . . . SUPERALLOY . . . HEAVY GALVANIZED . . . FLAT SPRING STEEL . . . *whatever your spring-material needs,* **NATIONAL-STANDARD** *has a complete line to give you one-source service. Many sizes are stocked for immediate delivery, others can be specially manufactured for 48-hour service, and all are produced with the quality and reliability of fifty-four years of experience.* **MUSIC SPRING WIRE:** *.002" to .250" diameter.* **STAINLESS STEEL SPRING WIRE:** *round—.0032" to .125" diameter; flat—.025" to .350" wide, .008" to .100" thick.* **HEAVY GALVANIZED SPRING WIRE:** *.012" to .060" diameter, 3-7% zinc by weight.* **SUPERALLOY SPRING WIRE:** *Inconel-X, NS-25 (L605), NS-A286, René 41, 17-7 PH, and others.* **FLAT SPRING STEEL:** *.001" to .065" thick, .015" to 6.5" wide tempered, .015" to 16" wide untempered.*

61-WO1A

FOR COMPLETE TECHNICAL DATA ON NS QUALITY SPRING MATERIAL WRITE TO:

NATIONAL-STANDARD COMPANY
Niles, Michigan



NS SPECIAL WIRE WITHSTANDS 1000°F

Landing hot jets like the McDonnell Phantom II at high speeds, means brakes and brake components must be able to withstand extreme temperatures without failure.

A leading manufacturer of brakes for jet aircraft came to National-Standard for help in finding a spring wire that would have high stress-temperature stability up to 1000°F. National-Standard engineers recommended an austenitic superalloy material, NS-A286, recently developed for spring wire applications by National-Standard. Tests showed that NS-A286 met requirements better than any other available alloy, yet cost only half as much as the next best alloy.

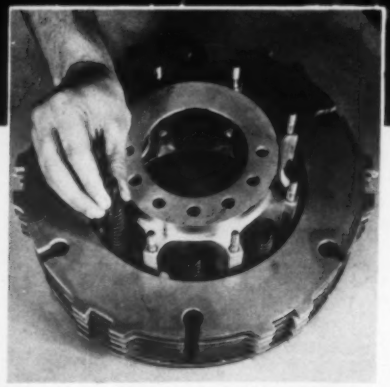
SUPERALLOY PASSES TEST—When brakes on the Phantom II are released, the NS-A286 return springs under the brake discs must separate the stationary stator discs from the moving rotor discs. The brake discs build up heat to 1400°F, which is quickly absorbed by the return springs, raising spring temperatures to as much as 1000°F. NS-A286 is a precipitation hardening alloy exhibiting as little as half the relaxation loss at 1000°F as comparable alloys show at 850°F. NS-A286 springs must retain their strength at this heat to separate the brake discs and guard against brake drag during landings.

To test NS-A286, engineers simulated stress-temperature characteristics of three landing conditions.

TO BRAKE JETS

Heat builds up in the brakes in 30 seconds and remains for as long as 20 minutes. The springs must work in the heat against a high back pressure maintained in the aircraft hydraulic system. Springs must be operational for at least 45 normal landings, 5 high-speed, gross weight landings, and one aborted take-off stop, corresponding to stopping the plane just before it becomes airborne. Under all test conditions, NS-A286 met every rigid requirement.

EXPERIENCED ENGINEERING HELP of this kind, for jobs requiring high-quality wire, to meet special or unique applications, is available to you from National-Standard. Write for additional information to National-Standard Company, Niles, Michigan.



NS-A286 SUPERALLOY WIRE, produced by National-Standard, meets critical stress-temperature demands for coaxial return springs in brakes of F4H-1 Phantom II.

Manufacturer of Specialty Wire and Metal Products

NATIONAL-STANDARD COMPANY

Niles, Michigan

ERICKSON QUICK CHANGE HOLDERS

...for use with your standard MMS tapered tools ...designed for presetting of tools

Now you can use your present standard MMS tapered tools with the *new* Erickson Quick Change Holders. That means you get the double production advantage of Erickson's *high precision coupled with the rapid change feature.*

Several different models comprise the line: Morse taper holders for boring mills and radial drills, milling machine holders that fit standard spindle tapers, turret lathe holders that increase turret lathe tool-holding capacity, straight shank holders with #30 or #40 MMS socket. These holders take Erickson Collet Chuck milling machine adapters in both regular and heavy duty types, end mill adapters, shell and face mill adapters, Morse taper adapters, boring head adapters, and chuck adapters for Jacobs internal taper.

AA-7455

A call or card will bring the Erickson representative on the double. Meantime write for your copy of Catalog G "Erickson Quick Change Holders."

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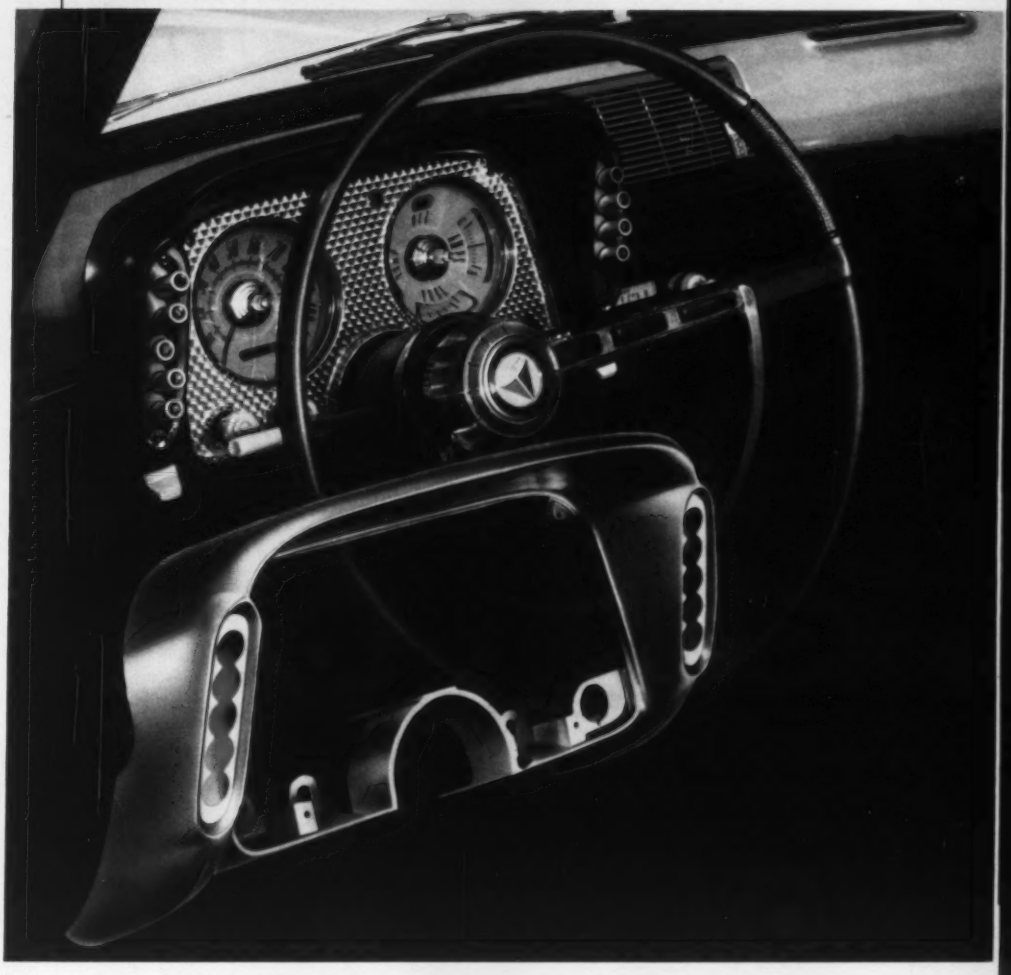
COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • EXPANDING-COLLETS • SPECIAL HOLDING FIXTURES

working with

Du Pont Delrin®

one of Du Pont's versatile engineering materials



New instrument housing of DELRIN®

cuts weight 80%... simplifies assembly

In designing a compact automobile, weight reduction stands out among the objectives—less weight means improved fuel economy and easier handling. That's one of the reasons why Chrysler Corporation's 1961 Valiant has a one-piece instrument housing molded of Du Pont DELRIN acetal resin. At no sacrifice in performance, the use of DELRIN cuts the weight of the instrument housing by approximately 80%—from nine pounds in die-cast zinc to two pounds in DELRIN. This reduction not only pays off in lower over-all weight, but also eases handling on the assembly line.

The attractively styled housings of DELRIN have proved their durability through extensive road and laboratory tests. DELRIN offers strength in thin sections, even at elevated temperatures . . . remains dimensionally stable under varying conditions of humidity. Mounting of the housing is simplified because molded-in bosses accept self-tapping studs.

On the following page you will find more examples of the product improvements and savings in manufacturing and assembly costs made possible by DELRIN acetal resins in a variety of diverse fields.

DU PONT

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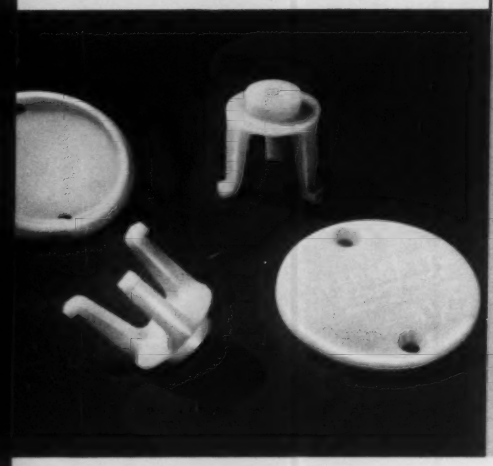
BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

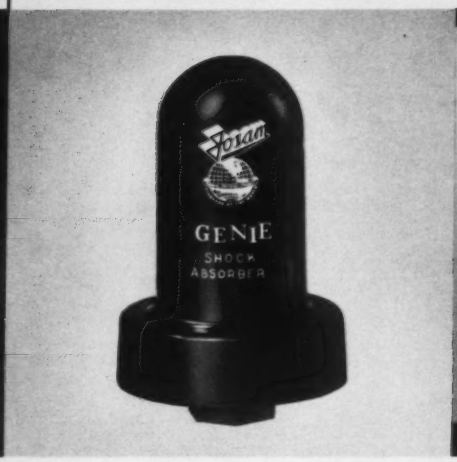
working with

Du Pont Delrin®

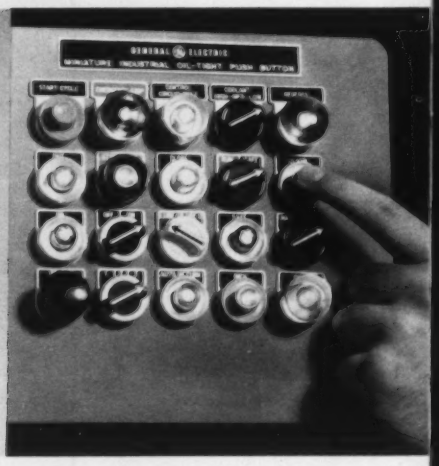
one of Du Pont's versatile engineering materials



The manufacturer of these valve components for check valves in water or gasoline pumping systems reports: "Severe testing proves that the disc retainer guide made of DELRIN is practically indestructible." Use of DELRIN instead of brass also prevents mineral build-up . . . eliminates the cause of valve sticking and faulty seating. (Molded by Holman Mfg. Co., for a division of Flomatic Corp., both of Hoosick Falls, N. Y.)



Shock absorber designed to eliminate water-hammer noises in residences has outer shell molded of tough Du Pont DELRIN. Reason for this choice: the shell of DELRIN is highly resistant to damage from residential shock pressures, exterior corrosion from most chemicals and water at 180°F. ("Genie" is molded for Josam Mfg. Company, Michigan, Indiana, by Stelrema Corp. of Gary, Indiana.)



A complete line of miniature oil-tight push buttons (colored buttons, rings and knobs) molded of Du Pont DELRIN to help provide easy identification. Designed for the toughest applications, these push buttons rely on the toughness, color variety, durability and wear resistance of Du Pont DELRIN acetal resin. (Manufactured by General Purpose Control Department of General Electric Co., Bloomington, Illinois.)

Parts of DELRIN® offer rugged, dependable performance under tough conditions

The strength, durability and dimensional stability of DELRIN acetal resin are particularly important when the part in question is subject to severe environmental conditions, such as high temperatures, moisture, solvent and many corrosive chemicals. In use after use, designers are continuing to find that DELRIN provides parts that will perform under these adverse conditions . . . plus substantial economies in manufacture and assembly. How about DELRIN for *your* product? Mail the coupon for further information.

POLYCHEMICALS DEPARTMENT

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E. I. du Pont de Nemours & Co. (Inc.)
Department I, Room 2507-D
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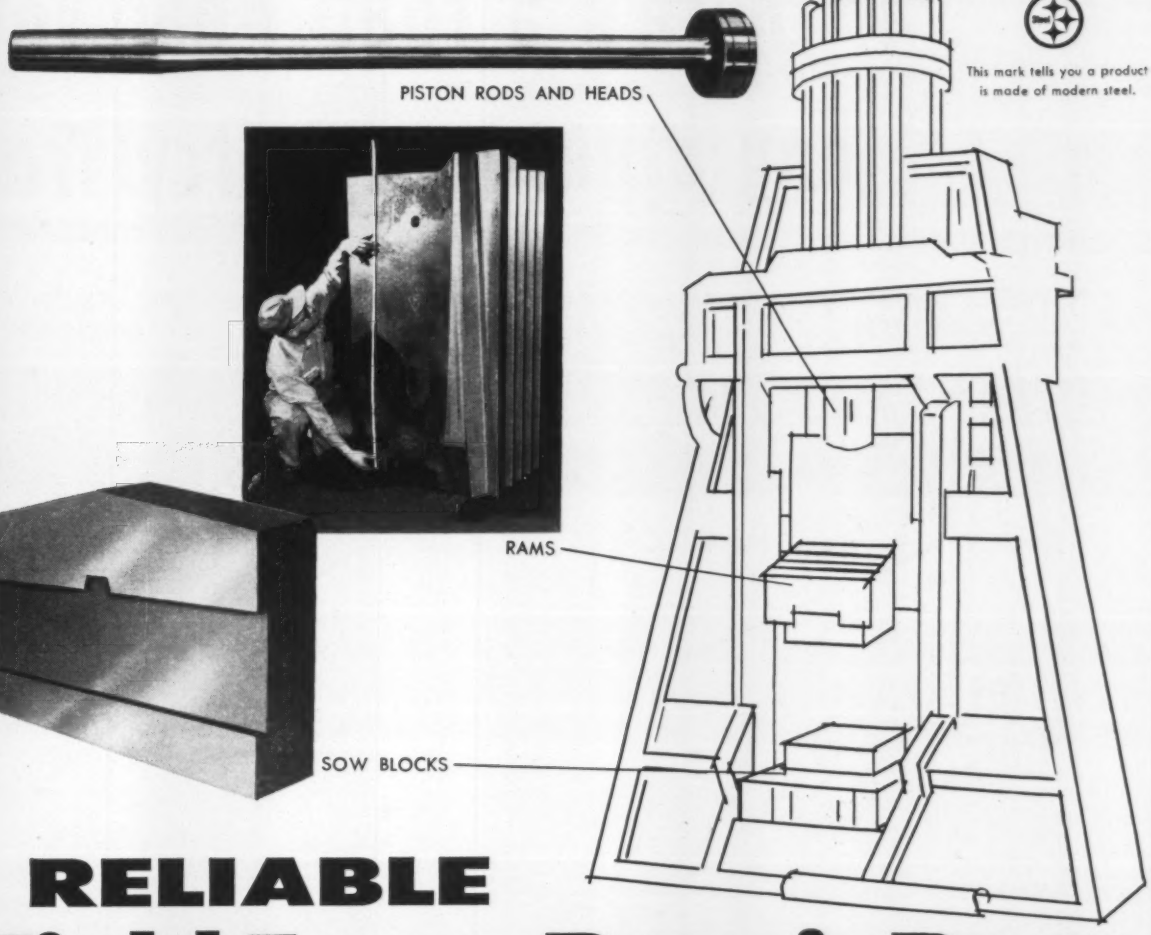
one of Du Pont's versatile engineering materials

Alathon® · Zytel® · Lucite®



This mark tells you a product is made of modern steel.

RELIABLE Finkl Forge Repair Parts

Write to **Dept. B,** on your company letterhead for free BULLETIN 400. It shows the wide variety of custom forgings produced and many of the facilities for producing them.

Forging equipment is probably the most self-destroying machinery in industry. By prolonging its life you can increase production efficiently and economically.

Finkl MO-LYB-DIE processed CNM alloy steel forge repair parts have the strength to withstand the extreme fatigue stresses and wear imposed by heavy-duty forging equipment. CNM forgings are the toughest of all forgings and are quality controlled through every step from our own electric furnace steel to ultrasonic testing.

Where maximum production and minimum maintenance are the first considerations, Finkl quenched and tempered products are recommended for such forge repair parts as rams, piston rods and heads, sow blocks, ram bushings, guides, crankshafts, columns, die holders, Pitmans, tie rods and toggles.

You get more from Finkl in quality products, continuing research, and engineering service. Call your Finkl representative for your forging, die block, and hot work steel needs.

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If there's a road near you, any steel in a hurry from

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CApitol 2-3283

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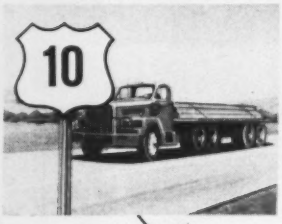
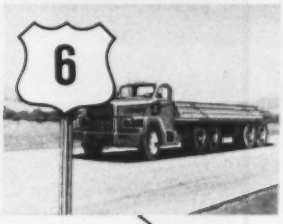


Moline Service Center
Phone 764-5616



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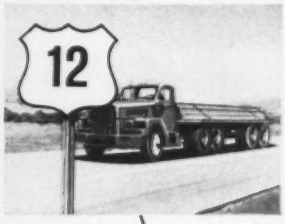

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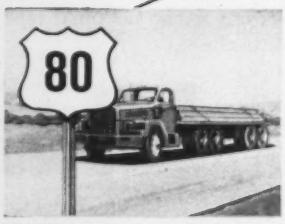
JEfferson 5-0440



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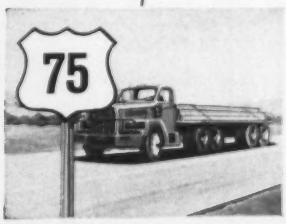

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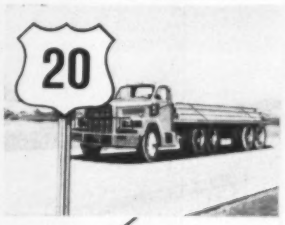

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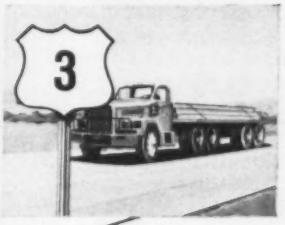

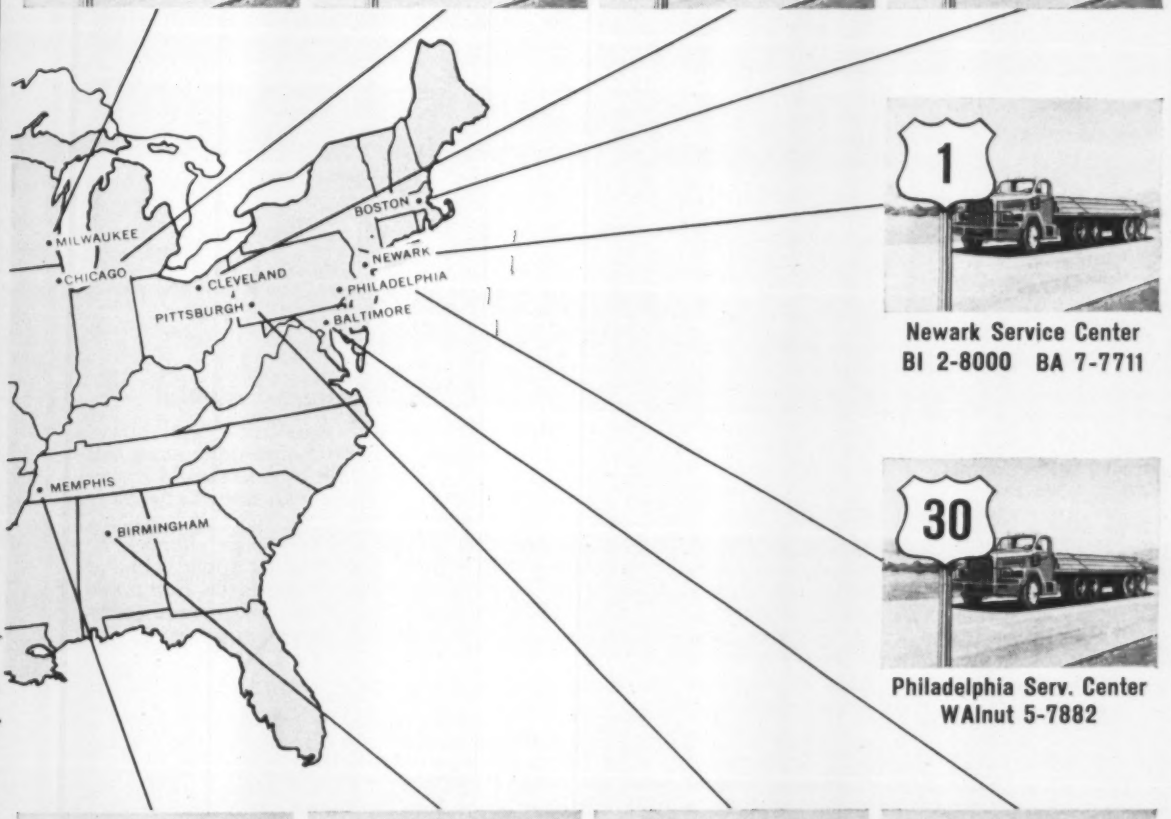

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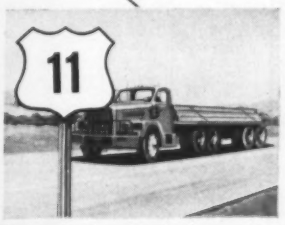
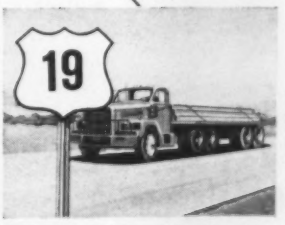
Philadelphia Serv. Center
WAlnut 5-7882

Memphis Service Center
WHitehall 8-6741



Birmingham Service Center
STate 7-9611



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FASTENOMICS

TIPS ON FASTENER APPLICATIONS BY STANSCREW

Socket Screw Standards Changed

Check Dimensional Revisions Now to Avoid Extra Costs

Important changes are now in progress in the socket screw industry. Every user should know the details and take appropriate action to avoid higher costs in the future. As a public service, Stanscrew is issuing this progress report.

New Standards Adopted

Exhaustive industry-wide studies, begun in 1954, culminated in 1959 with the adoption of new dimensional standards for socket head cap screws. Standard Screw participated in these studies and concurred in industry recommendations. The new standards, known as the "1960 Series", include changes in head diameters, socket sizes, and thread lengths.

Advantages of New Design

The "1960 Series" has been carefully engineered so there is functional uniformity for all sizes, particularly as applied to wrenching areas and to the relationship of head diameters to body diameters. It offers these important advantages over the previous design, known as the "1936 Series":

1. Larger wrenching area permits applications of clamping force . . . provides maximum utilization of fastener's inherent strength.
2. Provides increased bearing surface under the head . . . up to 233⅓% more.
3. Minimum indentation . . . particularly important with softer metals.

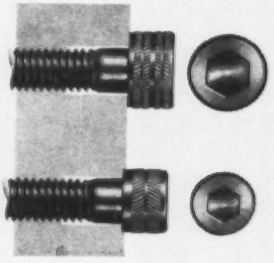
What's Available When

When the "1960 Series" was announced in 1959, it was believed it would become the only standard as of Jan. 1, 1961 and, thereafter, all "1936 Series" would be available only on special order. As previously announced, all sizes in the "1960 Series" are being supplied as standard. However, to make the transition as easy as possible, Stanscrew and other leading producers have extended the changeover period for certain sizes of the "1936 Series".

These are the sizes . . . 5/16", 7/16", 5/8", 3/4", 7/8" and 1" . . . for which the new standards include a change both in head diameter and socket width across flats. Until Jan. 1, 1963 both the "1936 Series" and "1960 Series" will be considered standard in these six sizes.

For all sizes, however, thread lengths are now being manufactured to "1960" standards. Once current inventories are depleted, "1936 Series" thread lengths will be available on special order only. Based on exhaustive surveys, this will prove no problem in the overwhelming majority of applications.

In some sizes . . . #1, #2, #4, #6, and #8 . . . head diameters are the same, but there has been a change in the socket width. In these sizes, current production is to "1960 Series" dimensions. These sizes are also available in the "1936 Series" until present stocks are depleted, but thereafter only on special order.



NEW 1960 SERIES

OLD 1936 SERIES

Change In Your Designs Essential

This industry program makes it essential that you review product designs to avoid future difficulties. All products now on your drawing boards should incorporate the "1960 Series" socket cap screws wherever possible. And, during the next two years, it is recommended you take advantage of model changes or other opportunities to change existing applications of the "1936 Series" to the "1960" standards. Failure to make provisions could result in procurement difficulties or the higher costs of non-standard items.

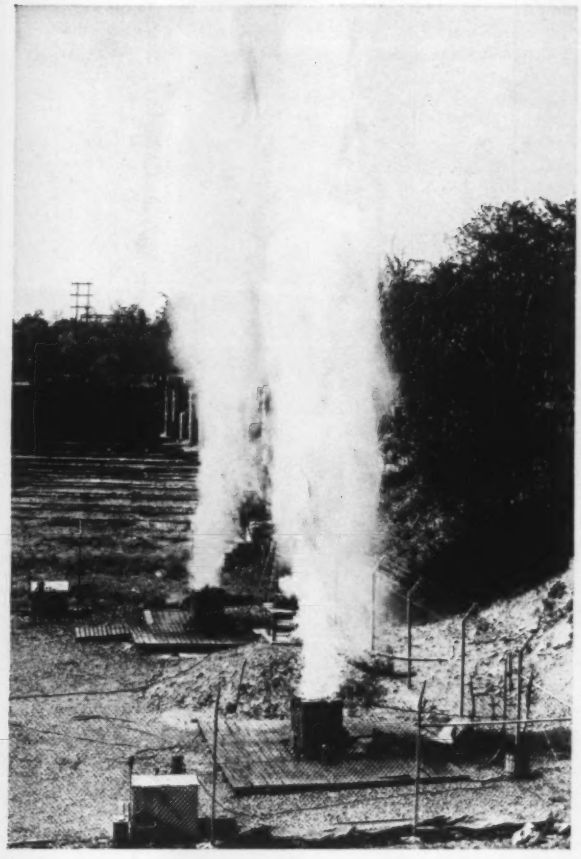
Complete Design Information Available

Stanscrew has prepared an up-to-date brochure giving complete information on all steps in this important transition, together with complete design data on both the "1960" and "1936 Series". You can obtain your copy through your local Stanscrew distributor. Call him today.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois



how Parish ingenuity reduced a forming operation to 1/1,000 of a second!

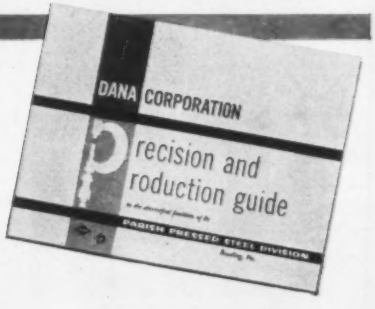
Operator removing an outer warhead shell formed and shaped by explosives.

problem: How to reduce the time and cost involved in forming large aluminum alloy missile warheads.

solution: Parish research engineers reduced the forming rate of aluminum inner and outer warhead shells to 1/1,000th of a second with explosives. A split die equipped with vacuum seals and an open top was used, with water serving as a transmitting medium for the Primacord explosive. Parish ingenuity dramatically reduced forming rates while keeping springback and work hardening to a minimum.

Parish facilities, skill and ingenuity have materially reduced time and cost on thousands of intricate production problems. If you have a production problem—large or small—requiring stamping, machining, forming, heat-treating, welding, balancing, forming and assembling, why not insure top-flight quality and performance by calling Parish today?

Write for your copy of this illustrated booklet describing the diversified facilities available to you at Parish.



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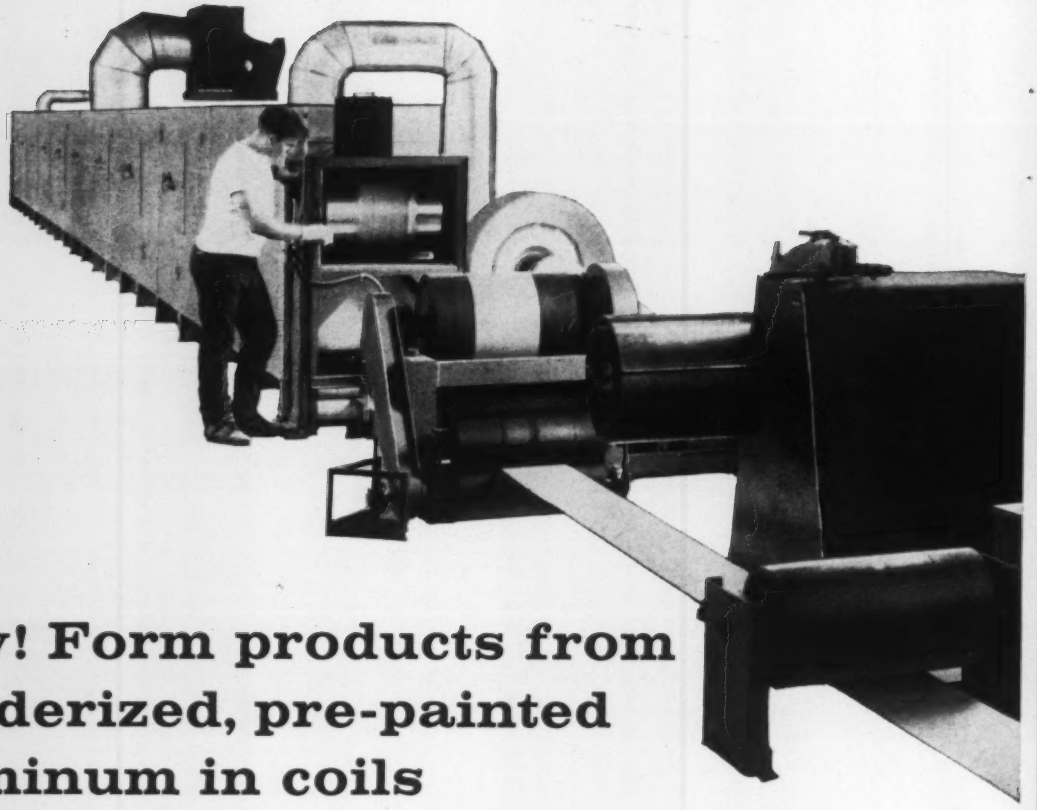
DIVISION OF DANA CORPORATION • READING, PENNSYLVANIA



Now! Form products from Bonderized, pre-painted aluminum in coils

A modern, new way to better products at lower manufacturing cost. Use Bonderized aluminum coil stock with baked-on paint, ready for fabricating.

Automated straight-line production assures uniform Bonderized and roll coat painted coil meeting the highest quality control standards.

The Bonderite coating on aluminum stock accomplishes the double job of controlling corrosion and anchoring the paint. Paint adhesion is so spectacular that the most severe forming operations can be accomplished without finish failure.

Service life of paint over Bonderized aluminum is five to ten times that on untreated aluminum!

Improve manufacturing efficiency, product performance and customer satisfaction by forming your aluminum products from Bonderized, pre-painted coil stock. The Parker representative has complete, helpful information for you.

Since 1914— leader in the field

Parker Rust Proof

2197 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base

BONDERITE and BONDERLUBE aids in cold forming of metals

PARCO COMPOUND rust resistant

PARCO LUBRITE—wear resistant for friction surface

**Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

PROTECTED BY Bonderite PARKER RUST PROOF CO. QUALITY CORROSION RESISTANT

The Bonderite seal is a recognized mark of quality

- Siding
- Shingles
- Roofing
- Architectural panels
- Gutters and downspouts
- Partitions
- Storm and screen frames
- Windows
- Awnings
- Cabinets
- Mobile homes

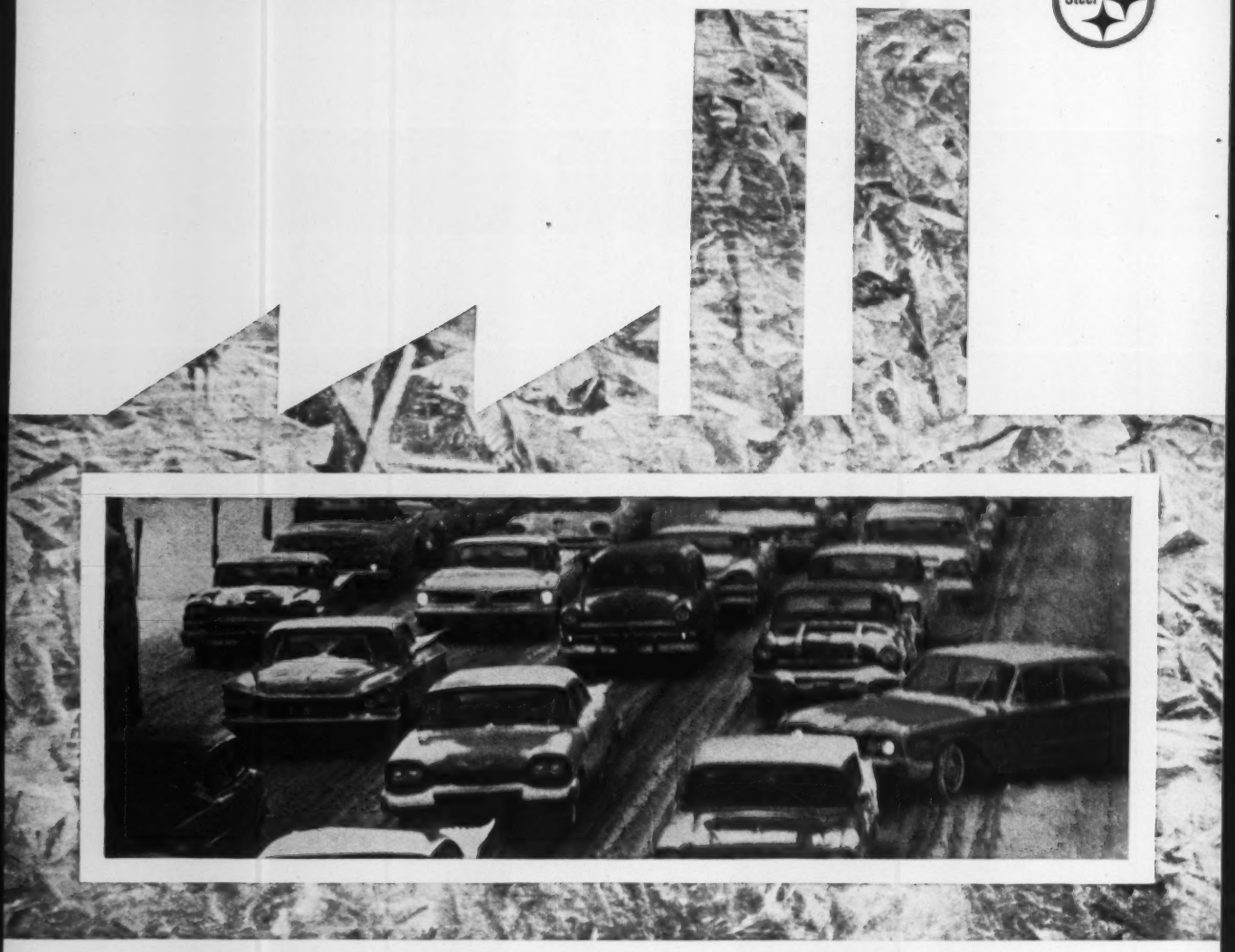
. . . a few of many aluminum products now being made from Bonderized *painted aluminum coil stock.*

Photo courtesy KEYSTONE ALLOYS COMPANY

Company

TROPICAL—heavy duty maintenance paints since 1883

The new generation of U.S. autos fends off corrosion . . .



GUARDED BY GALVANIZED STEEL

Use of galvanized steel sheets in the automotive industry has increased by more than 700% since 1954—and more automotive applications are on the way.

As a result of this growing addition to Detroit's diet, both consumers and manufacturers are benefiting. To car owners, every pound of galvanized steel means more complete corrosion protection, added durability and savings in maintenance. To manufacturers, galvanized steel's simplified fabricating procedures bring reduced costs. Head and tail lamp housings, for instance, formerly required five or six steps when zinc plated or painted after stamping. Now they are moved direct from press to assembly line with their tight zinc coatings completely undamaged by fabrication. This also applies to side members, rocker panels, front and rear rails and cross members.

WEIRKOTE, IN PARTICULAR! One of the leading galvanized steels, Weirkote is widely used in the latest model automobiles. To the inherent strength, economy and versatility of steel, Weirkote adds enduring zinc protection via the modern continuous process. As a result, it can be worked to the very limits of the steel base without chipping or peeling. And it assures you long-lasting protection against corrosion. It is manufactured by two National Steel divisions, Weirton Steel Company and Midwest Steel Corporation. Write Weirton Steel Company, Weirton, West Virginia, for further Weirkote details.

MIDWEST STEEL
Portage, Indiana

WEIRTON STEEL
Weirton, West Virginia

divisions of
NATIONAL STEEL CORPORATION

STEELWELD PRESS BRAKES

Hydraulic and Mechanical

Steelweld 400 Ton Hydraulic Press Brake. Bed and ram length 14'-0".

Hydraulic Press Brakes
Catalog No. 2024

Steelweld 320 Ton Mechanical Press Brake. Bed and ram length 12'-2".

Mechanical Press Brakes
Catalog No. 2023

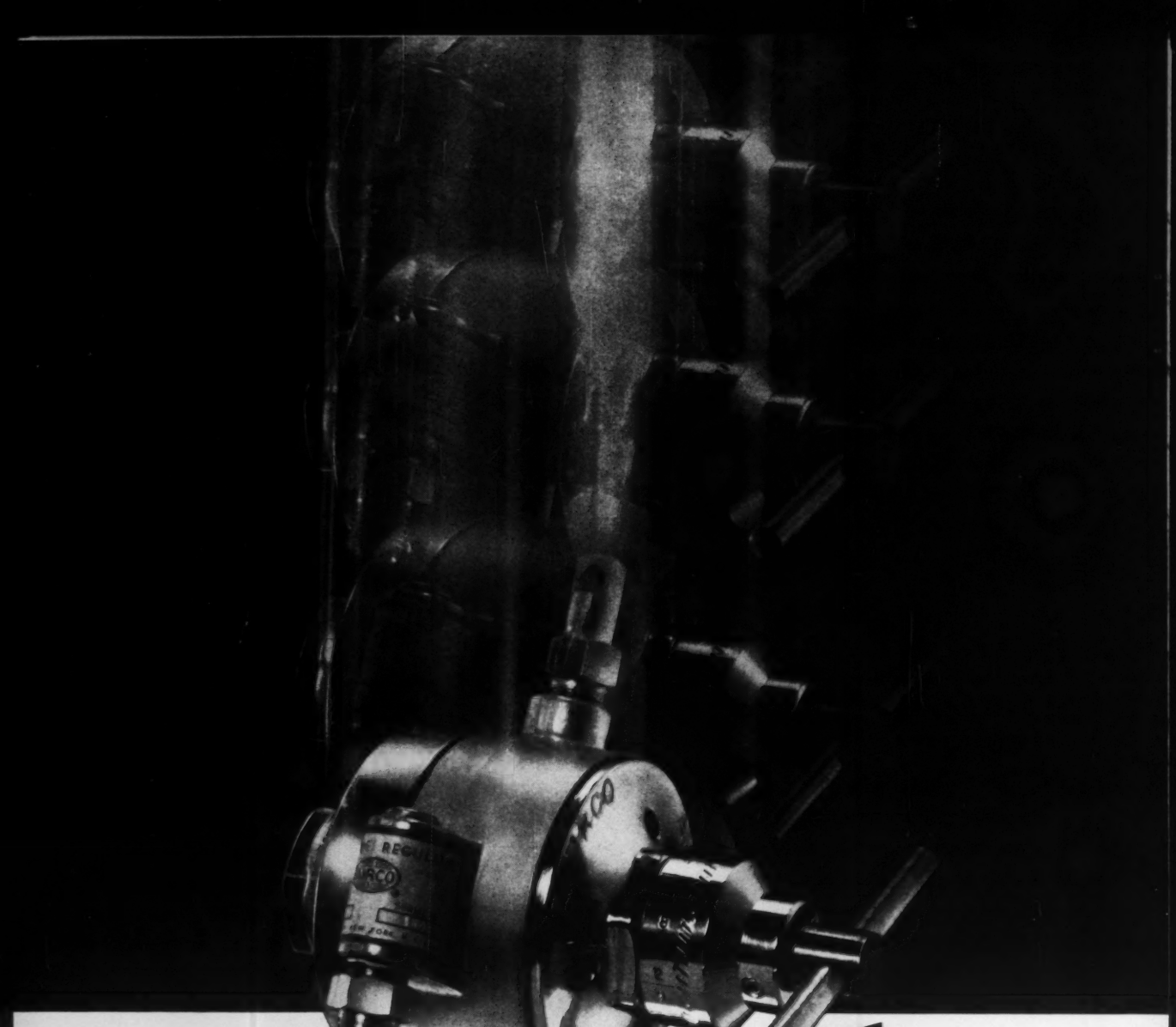
WHATEVER your requirements, there is a Steelweld Press Brake —hydraulic or mechanical—to best serve your needs. Available in all sizes to 2000 tons. For plate thicknesses to 2". For lengths to 30'-0".

Each type of machine, mechanical or hydraulic, has its particular advantages. The work to be performed is the determining factor for most satisfactory machine selection.

As a manufacturer of both types of press brakes, we are in a position to offer you either one without partiality. Therefore, we urge you to get the complete story, the Steelweld story, when considering the purchase of a new brake. Ask for free catalogs.

STEELWELD
Mechanical and Hydraulic
PRESS BRAKES

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4875 E. 281 ST. • WICKLIFFE, OHIO



TOUGHEST

AIRCO'S NEW GAUGELESS REGULATOR

We dropped a new Airco Gaugeless Regulator on a concrete floor . . . to test its toughness . . . and it came up accurate as ever! It does away with breakable dials. It is designed and built especially for construction and maintenance work.

How is content indicated? By a sturdy 4-ring indicator nestled within a solid brass protective housing. As gas volume goes down, the plunger goes down. *How is working pressure indicated?* You read it accurately directly from the adjustable micrometer dial.

Nothing to crack up here! **If rough handling** is frequent in your operation, you'll save money for your company by installing new Airco Gaugeless Regulators.

Specify Airco—industry's most complete line of quality regulators, gas welding and cutting torches, tips, electrodes, spotwelders, welding machines, supplies and high purity industrial gases. Look for your nearest Authorized Airco Distributor in your Classified Telephone Directory, under "Welding Equipment and Supplies."

AIRCO®

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated

150 East 42nd Street, New York 17, N. Y.

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Air Reduction Pacific Company

Internationally—
Airco Company International

In Canada—
Air Reduction Canada Limited

All divisions or subsidiaries of Air Reduction Company, Inc.

Important differences in fire-resistant fluids

Unlike petroleum oils, fire-resistant fluids have markedly different chemical properties which should be carefully considered before making a final selection.

To simplify this selection, we show here some of the variables—and limitations—of the three major fire-resistant types. Houghton is uniquely qualified for this unbiased analysis since we favor no one type over another. We make them all—and a full range of hydraulic packings as well.

1. Water-Glycol Fluids

These fluids contain water, glycol and a thickener. They provide the highest degree of fire protection. They are also compatible with the widest range of packing materials including those commonly used with petroleum oils. They should only be used, however, in systems operating at reservoir temperatures below 150°F.

Houghton's Houghto-Safe 200 and 600 Series are of this type and enjoy top acceptance and use by the armed services, as well as general industry. This wide-spread usage is due to important additives that provide *extra* anti-wear, rust inhibiting, anti-foam and metal deactivator properties to improve performance and increase pump life.

2. Phosphate-Ester Fluids

Fluids of this type are composed of straight phosphate esters and may contain small amounts of additives. These fluids can be used over the widest range of hydraulic pressures; they provide maximum lubricity for heavy bearing loads, and will stand up where ambient temperatures exceed 150°F. Packings used with these fluids must be Butyl, Butyl-Fabric or Polysulphide-impregnated Leather.

Houghton's Houghto-Safe 1000 Series are phosphate-ester fluids specially selected and compounded with additives to improve wear and rust resistance and add other proven operating benefits. Here again, Houghto-Safe 1000 Series has earned acceptance and is used on many military and space projects, as well as many of industry's toughest applications.

3. Emulsion Fluids

These fluids are either emulsions of water-in-oil (non-ionic) or oil-in-water (anionic). The following statements pertain to the water-in-oil type which are most widely used in industrial hydraulic systems.

Since these fluids are made of water and petroleum, they are compatible with standard Buna N rubber packings. They are also the lowest cost of all fire-resistant fluids. Their fire resistance is also the lowest of all three types; they should be used only in areas requiring a moderately safe fluid. The operating pressures of these fluids is generally limited to under 1000 psi.

Houghto-Safe 5000 Series designates Houghton's emulsion type fluid. It is a water-in-oil (non-ionic) fluid not affected by water hardness. Special additives are used to provide stability of the emulsion and to increase lubricity.

COMPARISON OF HYDRAULIC FLUIDS

Fluid Type	Viscosity Temperature Characteristics	Fire Resistance	Lubricity	Max. Fluid Temp. °F.	Relative Cost
Emulsion Fluids	Fair	Fair	Fair	See Note	1
Water-Glycol Fluids	Very Good	Excellent	Good	See Note	2
Phosphate-Ester Fluids	Poor	Good	Very Good	See Note	3

NOTE:—The Joint Industry Conference (JIC) Hydraulic Standards recommends the following where systems are operated continuously.

1. **For water base fire-resistant fluids, the temperature of the fluid should be controlled so as not to exceed 120°F. at the pump inlet.**
2. **For other fluids, including petroleum oil, the temperature of the fluid should be controlled so as not to exceed 130°F. at the pump inlet.**

For unusual system conditions where it is impossible to adhere to these reservoir temperature levels, the Houghton representative should be consulted.

For detailed information booklet describing all types of fire-resistant fluids, or help in selection, call your Houghton representative or write: E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION

Burst-test for cylindrical-pressure vessels fabricated from USS 9% Nickel Steel, cooled to —320°F, then pressurized to bursting. This one was quenched and tempered—not stress relieved.

Same vessel after bursting at a pressure of 2,160 psi—almost 6 times the design stress of 370 psi.

Operation Cryogenics—Success story of USS

Destruction tests on welded tanks holding liquid nitrogen prove that vessels made from quenched and tempered or double normalized and tempered 9% Nickel Steel, *without* post-fabrication stress relieving, equal—and often exceed—the performance of vessels made of the same steel, which are stress relieved after fabrication.

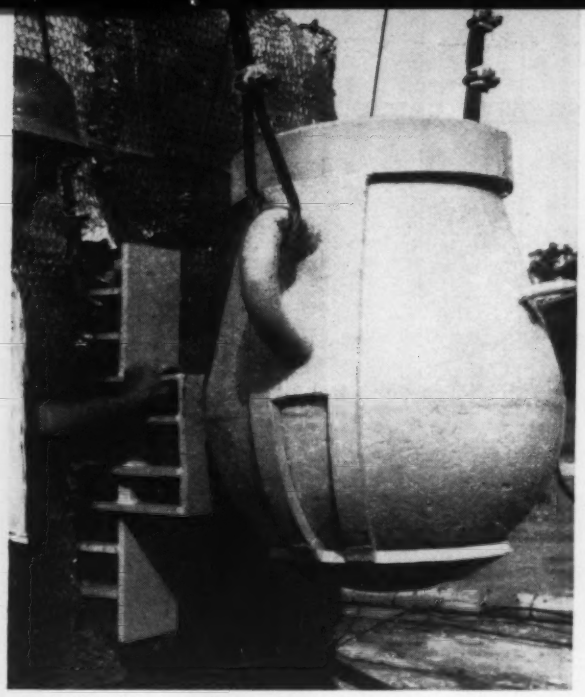
Recently, a series of impact and burst tests, known as "Operation Cryogenics," were performed on 9% Nickel Steel pressure vessels at the Fairless Works of United States Steel. The science of cryogenics, involving the development and practical utilization of materials in extremely low-temperature service, has assumed major importance in industry and in national defense. Much preliminary and advanced development work has been done cooperatively by The International Nickel Company, Inc., The Chicago Bridge & Iron Company, and United States Steel Corporation.

Objectives of "Operation Cryogenics" were to demonstrate (1) the suitability of 9% Nickel Steel, quenched and tempered or double normalized and tempered, in the as-welded condition (not stress relieved), for very low-temperature use; (2) the excellent properties of quenched and tempered 9% Nickel Steel; (3) the ductile behavior of 9% Nickel Steel in the as-welded condition during enforced failure at very low temperature; (4) the behavior of 9% Nickel Steel in the stress-relieved condition for very low-temperature use.

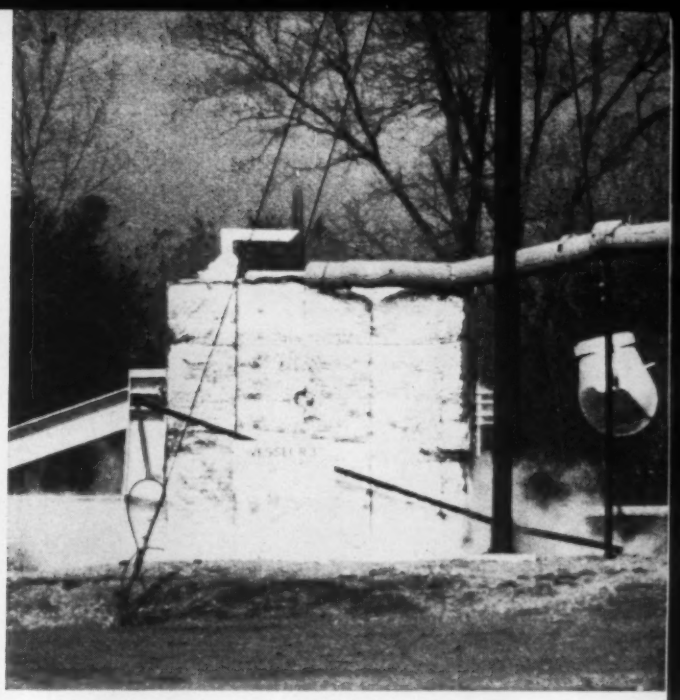
Test conditions: Two basic types of vessels were tested—rectangular vessels 8 feet square and 6 feet high simulating a type that might be used for shipboard transportation of liquefied gases, and cylindrical vessels 4 feet in diameter and 13 feet long with hemispherical heads such as are used for land-based storage and transportation of liquefied gases. All vessels were welded from economical 9% Nickel Steel plate $\frac{3}{8}$" thick, from the same heat of steel.

A total of nine vessels was built for the test. Five were made from 9% Nickel Steel plates and forgings in the quenched and tempered condition (QT) and four in the double normalized and tempered condition (NNT). Further, six of the vessels were tested as welded (AW), without any heat treatment after fabrication. Three were stress relieved (SR).

Impact test results. Impact testing of the three rectangular vessels, refrigerated with liquid nitrogen to –320°F, illustrated that 9% Nickel Steel vessels are capable of undergoing extensive plastic deformation even at extremely low temperatures. The vessels were repeatedly impacted both under pressure and without pressure by blows exceeding 80,000 foot-pounds. One quenched and tempered vessel did not fail, despite 7 impacts. Results clearly indicated the ability of quenched and tempered 9% Nickel Steel vessels in the as-welded condition (not stress relieved) to withstand impacts far beyond any which are likely to occur in service.



4340-pound wrecking ball used in striking rectangular vessels from varying heights.



Impact Test—Rectangular vessel of 9% Nickel Steel quenched and tempered but not stress relieved, refrigerated to —320°F. Withstood severe impact of 82,460 foot-pounds and did not fracture, proving superior strength and toughness of the steel.

9% Nickel Steel Tanks punished at -320°F.

Burst test results. The cylindrical vessels were designed for 370 psi internal pressure (hoop stress in shell equal to 23,750 psi). These vessels were refrigerated to -320°F with liquid nitrogen and pressurized to failure. *The burst pressure for all vessels was at least four times the design pressure of 370 psi and one of the non stress-relieved vessels didn't burst until 2,300 psi.*
(See Table I)

These tests prove that USS 9% Nickel Steel has the high strength, toughness, and weldability needed for low-temperature pressure vessels.

We urge you to consider USS 9% Nickel Steel for economical low-temperature vessels. For the complete story, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

BURST TESTS 9% NICKEL STEEL CYLINDRICAL VESSELS

	PC-1	PC-2	PC-3	PC-4	C-5	PC-6
Heat Treatment	QT	NNT	QT	NNT	QT	NNT
Test Condition	AW	SR	SR	AW	AW	SR
Temp of Vessel (°F) at start of test	—308	—320	—320	—320	—320	—322
Temp. of Vessel at Failure (°F)	—304	—320	—311	—310	—302	—314
Burst pressure (psi)	2,275	1,550	2,125	2,300	2,160	2,100
Burst stress (psi)	135,510	92,920	129,800	135,730	132,500	129,100

TABLE I. Complete data are shown for burst testing of the cylindrical vessels. In each test, the vessel was filled with liquid nitrogen, supply valves were closed, and pumping continued to build up pressure to bursting point. The data show quenched and tempered (QT) or double normalized and tempered (NNT) vessels in the as-welded (AW) condition withstood greater burst pressures and stresses than did the stress-relieved (SR) vessels.

IMPACT TESTS 9% NICKEL STEEL RECTANGULAR VESSELS

	PR-1	PR-2	R-3
Heat Treatment	QT	NNT	QT
Test Condition	AW	AW	AW
Impact number	#9 of 11	#5 of 6	#7 of 7
Vessel Temp. (°F)	—293	—317	—308
Height of Drop, ft.	19	19	19
Kinetic energy of 4340 lb. weight (ft-lb)	82,460	82,460	82,460
Impact Velocity of 4340 lb. weight (fps)	35	35	35
Vessel pressure before Impact (PSI)	106	100	0
Total indentation after test (inches)	2.44	1.38	3.38

Table II. Data are shown only for the impacts which resulted in cracking or fracture of vessels PR-1 and PR-2. The two vessels were subjected to repetitive tests under increasingly severe impact and pressure conditions, leading up to the test which finally enforced failure. Additional impact tests were conducted on the failed vessels to determine further distortion and dimensional effects. For vessel R-3, which did not fail, data are shown only for the last impact.

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Columbia-Geneva Steel—San Francisco
National Tube—Pittsburgh
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
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United States Steel

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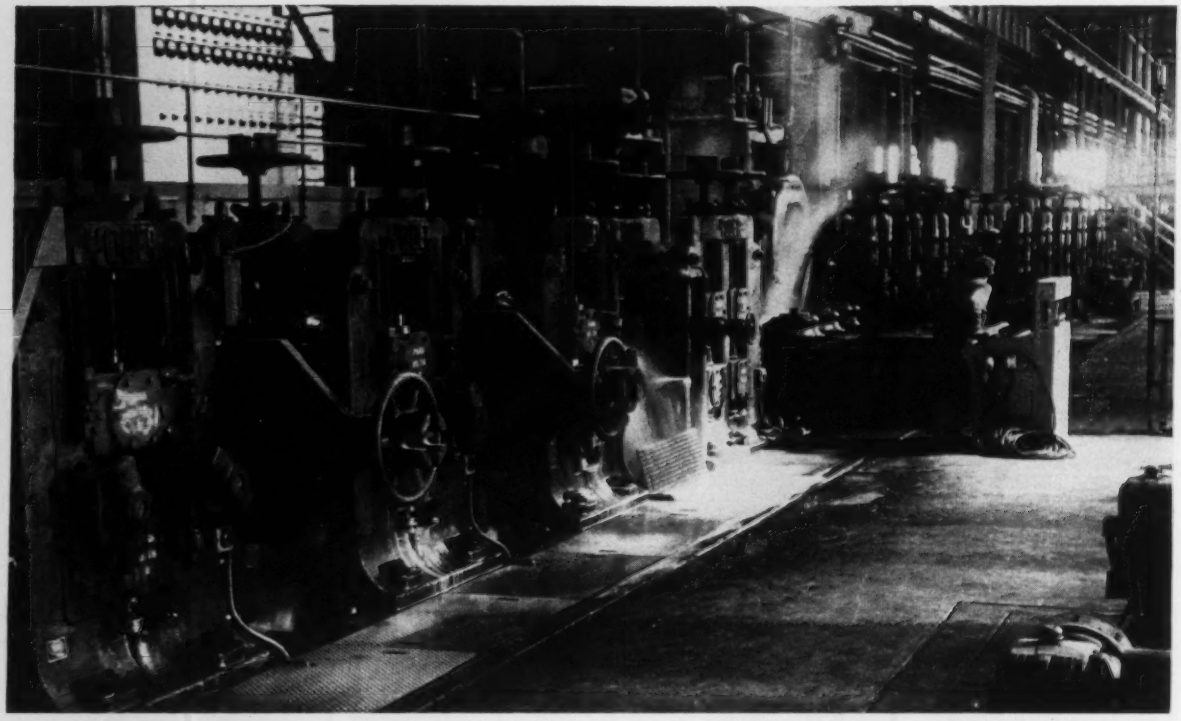

Yoder equipment produces 10, 12, and 14-inch electric-weld pipe at Kaiser Steel

The Kaiser Steel Company, Fontana, California —like many other primary metal suppliers— utilizes the speed, efficiency and dependability of Yoder-engineered equipment. Shown above is the Kaiser-owned Yoder electric-weld pipe mill used for the high speed production of 10, 12, and 14-inch pipe.

Yoder pipe and tube mills are engineered for ferrous or non-ferrous pipe and tube from $\frac{5}{16}$-inch to 26-inch diameters.

For complete detailed information on Yoder Pipe and Tube Mills or Slitting Lines, write for either of these free books:

- ☐ Yoder Pipe Mill Manual
- ☐ Yoder Slitting Equipment Manual

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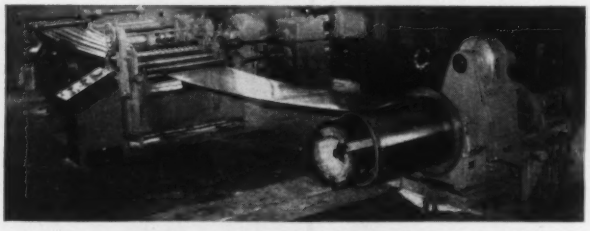
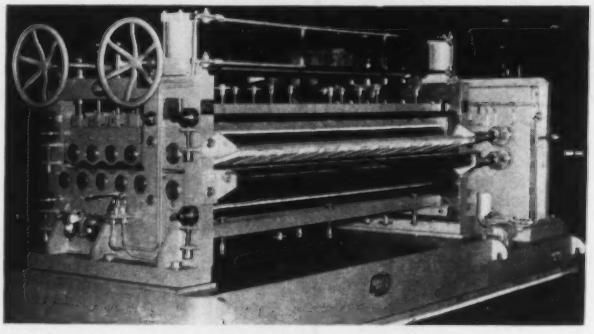


Complete Yoder Slitting Line



Nine-roll Yoder Leveller

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Roebling Tire Bead Wire: Packaged for Maximum Benefit

The problems eliminated by this unique reel-less core packaging system are manifold. Loads are palletized two cores per pallet and may be stacked two or three high. This, plus the fact that you need not accumulate empty reels means storage space requirements are cut to *less than half*. You do away with all freight and handling costs on reels, the bother and expense of "bookkeeping" returnable reels, and the freezing of money in reel deposits.

This is typical of Roebling's advanced packaging methods—that makes handling Roebling high-quality wire so much easier. For details on this efficient Roebling Tire Bead Wire packaging method, or information on other types of Roebling wire, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

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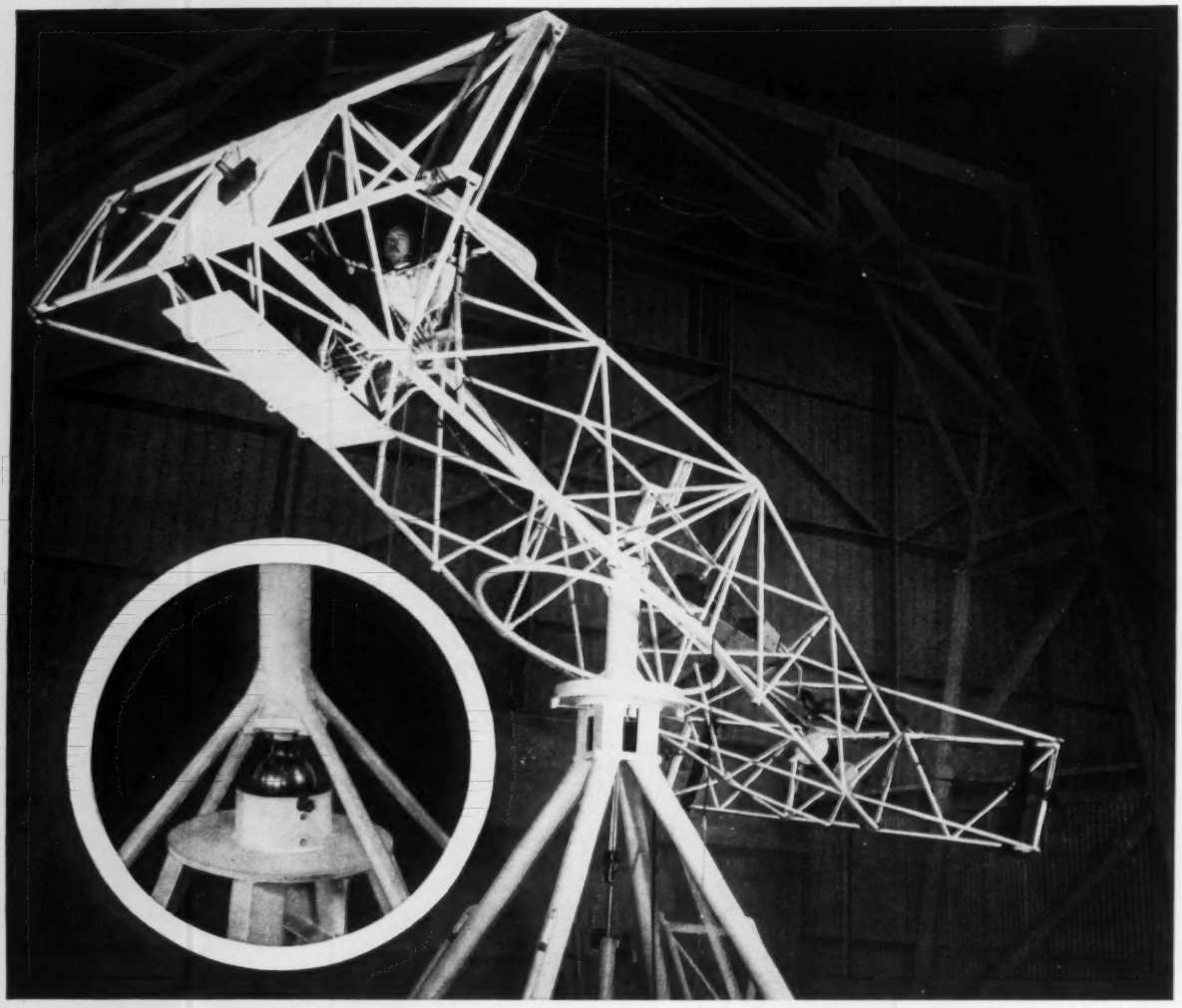

MAKE-BELIEVE FLIGHT—Much of the feeling of flight in a space vehicle is experienced during a ride in this reaction-control simulator, being put through its paces at Boeing Airplane Co., Seattle, Wash. The simulator rides atop the nickel alloy steel ball plated with Nickel in Boeing's ball-and-socket type air bearing.

Space simulator gives the "feel" of flight

Nickel-plated ball of high strength steel supports reaction-control test vehicle

This earthbound space machine is designed to test ways of controlling a vehicle as it pitches, rolls and yaws in the airless reaches of outer space.

In action, the simulator and its payload of test equipment can weigh as much as 5,000 pounds. Yet the necessary sensitivity is achieved by floating the unit on an air-cushion bearing made of a high strength nickel alloy steel ball in its socket.

Imagine this 2½-ton load resting on a ball about the size of a grapefruit! The ball, made of nickel alloy steel heat treated to a tensile strength of 180,000 to 200,000 pounds per square inch, stands up to the load. To provide a hard, smooth surface, the ball is plated with one-thousandth of an inch of Nickel. This uniform surface keeps air leakage in the bearing to a minimum.

Remarkably durable, Nickel and its alloys offer practical solutions to problems of stress, fatigue, abrasion, corrosion or temperature extremes. Used in alloys, in plated coatings or by itself, Nickel helps make possible many new products and processes—and can help improve existing ones—by providing unique combinations of properties.

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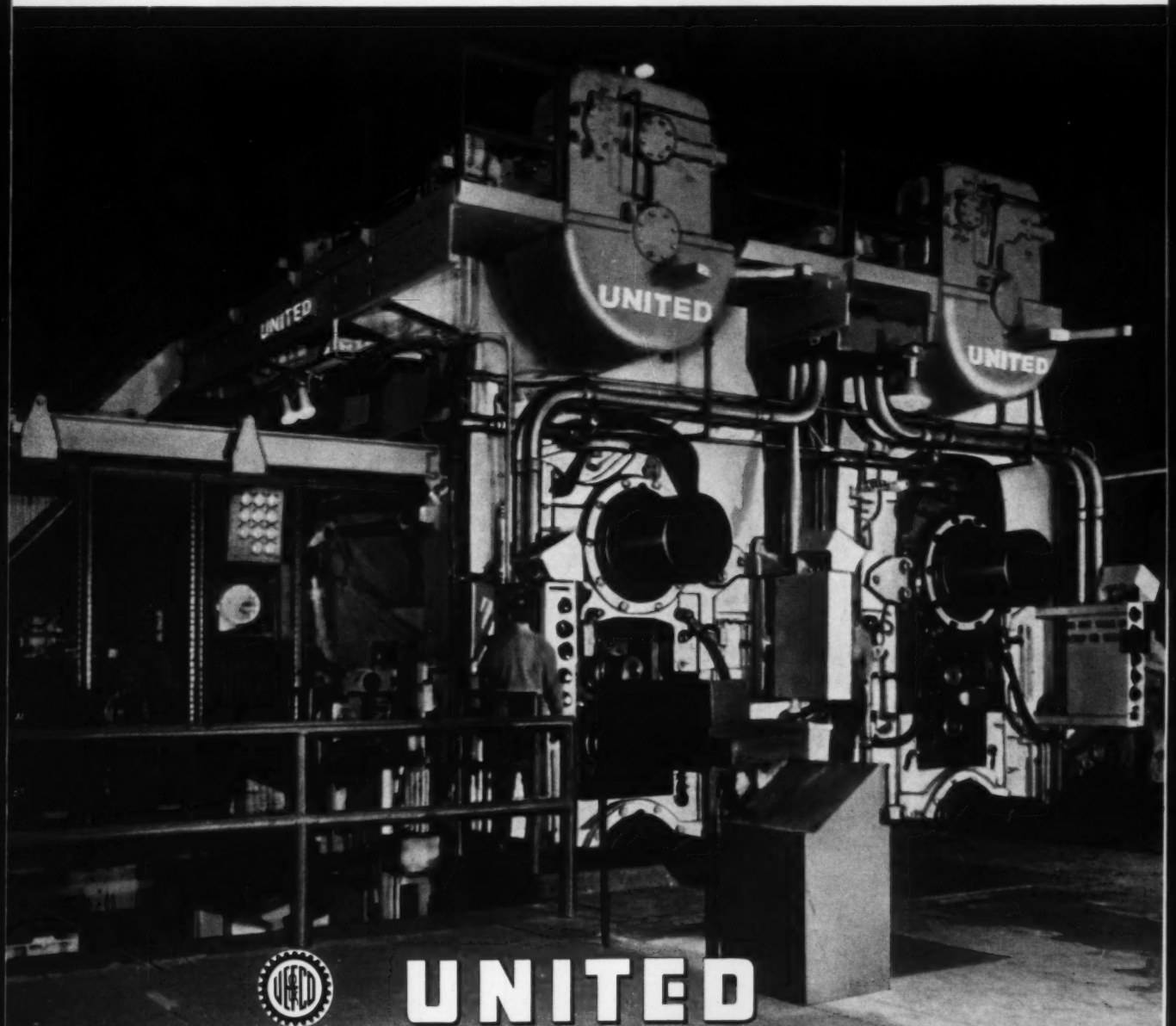

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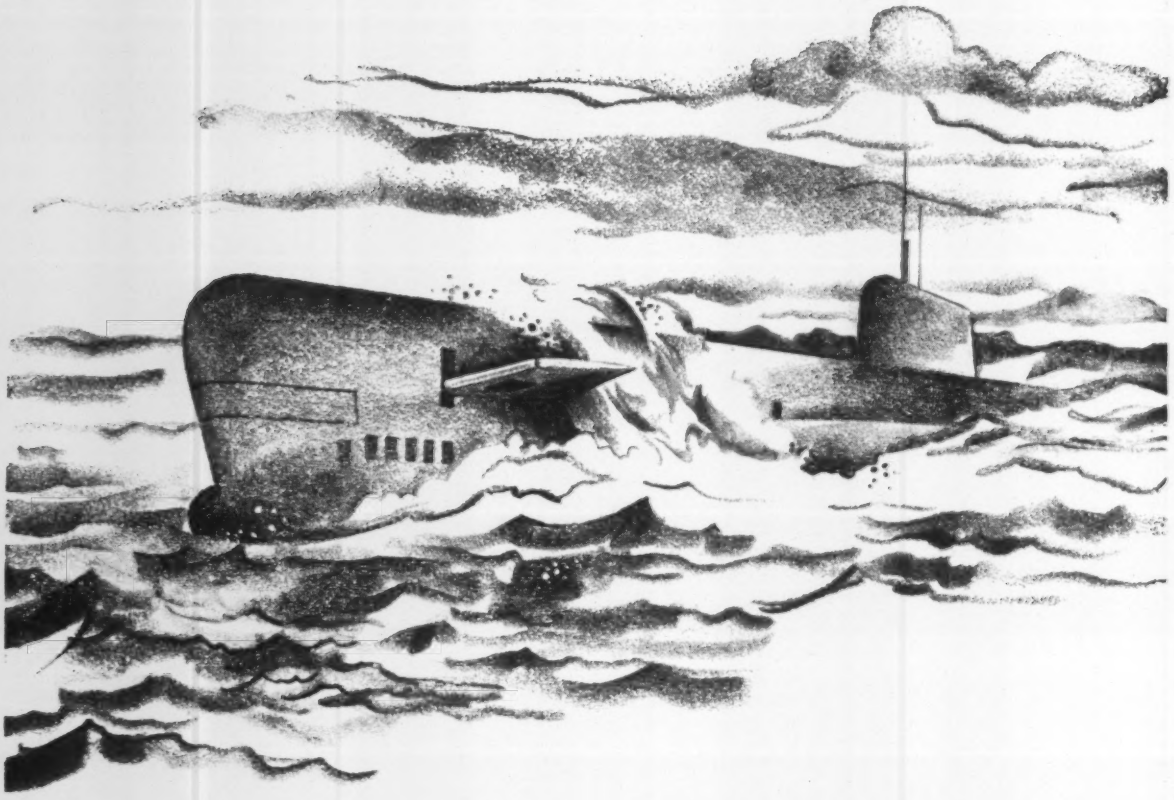

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Metalworking Newsfront 6

RECESSION ATMOSPHERE HASN'T killed off capital spending plans of many major corporations. Some believe a period of low operations is the time to make equipment replacement and plant improvement. One example: U. S. Steel has authorized projects totaling $500 million. Chairman Roger M. Blough says now is a good time for plant improvements. Operations are less disrupted, delivery and installation are good, employment aided.

NEWEST CONSUMER CREDIT PLAN is one proposed at recent meeting of National Assn. of Home Builders. It calls for mortgage payments for the first 5 years based on a 40-year mortgage, the next 5 years on a 30-year basis, and the next 5 years on a 20-year basis. This is designed to open wide the house market for young couples as early-year payments would be very low.

JANUARY AUTO OUTPUT TUMBLED from year-ago heights. Ford car and truck production last month totaled 142,472 units, down 40 pct from January 1960. General Motors produced 283,066 units, down 30 pct. And Chrysler made 41,785 units, down 63 pct.

MEETING FOREIGN COMPETITION "HEAD-ON" has paid off for toolmaker National Acme Co. Its president, T. L. Strimple, sent his top sales, production and technical people overseas to take a first-hand look at the competition. The company credits this action and improved methods and techniques as boosting export sales into a big part of its 31.6 pct sales increase in 1960.

NEW INTEREST BY MARKET ANALYSTS is being given to consumer spending for services. About three times more is spent for services than for durable goods. Placing the statistics in marketing perspective, economist L. H. Haney states; "Service costs . . . are becoming too great to allow much further expansion in the purchase of consumer goods or commodities."

EQUIPMENT RENTAL AND LEASE PLANS offered by metalwork companies are paying off despite generally slipping equipment sales. One company, American Machine & Foundry Corp., expects rental income to exceed $80 million, up 10 pct over 1960.

THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows an 8.8 pct increase in December 1960 from November. The December index was 216.5 (1947-49=100) for new bookings.

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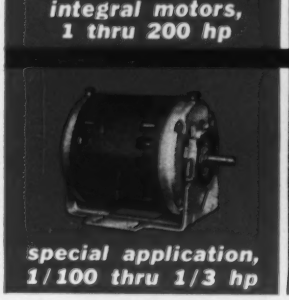
Write today for information, or send your powering problem to R&M. No obligation, of course!



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WINTER'S IMPACT: Severe snows and cold have bogged down the Eastern U. S. and discouraged sales.

Industry Reels Under Buffeting By Winter's Icy Blasts

Along the East Coast and in New England, fierce winter helps hold down sales.

Affected are sales of new and used cars, appliances, and home furnishings. Also hurt: Construction work and freight car loadings.

■ Looking out a showroom window, an auto salesman asks, "Who wants to buy a new car when there's a foot of snow on the ground?"

His remark points up a current setback to business: Severe winter weather. Snow, sleet, ice, and subnormal temperatures, the worst in years in some areas, are doing their best to slow down sales, snarl shipments, and delay deliveries.

Most adversely affected are sales of cars (new and used), appliances, home furnishings, and steel products. Also hurt are freight car loadings, truck shipments, and construction work.

East Hurt Most — Most of the trouble centers in the New England and Middle Atlantic states where the snow and cold are setting records. Sales losses there, and elsewhere, are adding to general business woes.

Here are the effects for major industries:

Autos: Car sales in January are estimated at about 380,000. If correct, this would be the worst January for sales since 1954. Meanwhile, the automakers turned out 414,000 cars during the month. Original car making schedules for February called for 430,000 cars. But automakers may cut this below 400,000 if the slow sales pace continues.

One effect of the bad weather has been a big boost in dealer inventories of compact cars. It's estimated the number of compacts on hand could last two months at current selling rates in some cases.

Slump After Snow — An East Coast sales official for one of the Big Three automakers sums it up this way: "The weather was probably responsible for a very sharp reduction in sales during a five-to-ten day period toward the end of January.

"Our sales in this district had been running about 112 cars a day up to Jan. 20. Then they dropped to 72 cars a day. Now they've come back a little to 95 cars a day. Prior to the snow storms, sales in the district were running about 45 pct ahead of last year."

Pittsburgh area dealers say showroom traffic dropped in January after a good start. Statistics and reports show the snow slowed auto sales. Experience in other years indicates demand for cars can be

strong in the winter months, they point out. But conditions this year have hurt.

Used car sales were especially hurt by the cold and snow because most lots are out in the open. An auto sales official in Philadelphia reports used car dealers complain this was the worst January in ten years.

Retail Sales: A sharp decline in orders in December and January, especially for durables, is partly blamed on the poor weather. (See chart.)

Says Louis J. Paradiso, chief economist, Office of Business Economics, U. S. Dept. of Commerce: "The weather, more severe than normal in the Northeast and Middle Atlantic states, had a pronounced effect on most economic activity in December.

"Retail sales were sharply curtailed, particularly at durable goods stores. These items are postponable; people are in no hurry to buy them. As the storms disappeared, increased buying made up some of the losses. It looks like the January cold also may have had some effect on business activity."

Hardest hit by declines in retail trade were the New England and Middle Atlantic areas. Compared with the last week in January 1960, **Dun & Bradstreet, Inc.**, reports dollar volume of retail trade for the U. S. was down 6 to 10 pct this year.

Appliance Sales Suffer — But in the New England region, retail sales were off 19 to 23 pct, and in the Middle Atlantic states, 17 to 21 pct. (This followed the heavy snowfall of January 19-20, which dumped more than a foot of snow in many areas along the Eastern seaboard.)

A leading appliance dealer in the Philadelphia area says, "Appliance sales suffered severely in December and January. Usually this is a good period because of Christmas and January clearance sales. However, the bad weather this year is probably responsible for a drop of nearly 30 pct."

Steel Sales: Most of winter's slap was felt by steel mills and warehouses in deferred orders and shipping delays. Even the record-shattering cold and snow couldn't be entirely blamed for the slow market.

"Of course, the weather has hurt sales," says one East Coast steel sales manager. "But how much we can't tell. The weather isn't the only thing wrong with the market."

Some steel fabricating work and construction was delayed because preliminary concrete foundation work could not be completed. But auto chain makers even benefited from the storms, with some now working three shifts a day.

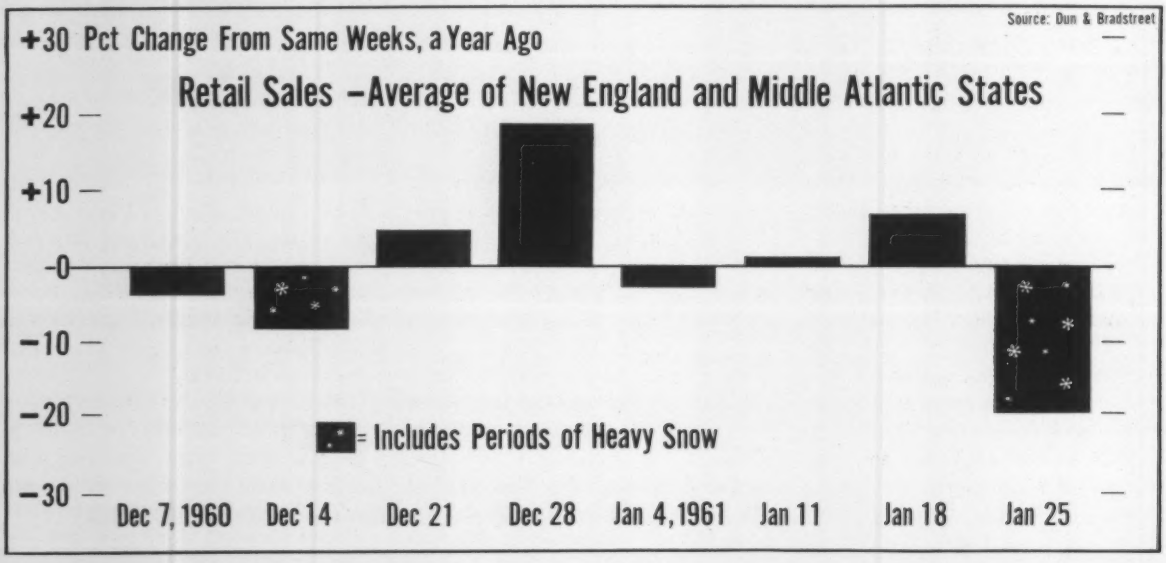
Warehouse Problems — Service centers are experiencing delays in getting out orders. One Philadelphia warehouseman comments, "Right after the storms we had only a few workers who managed to get in. Many of our truck drivers couldn't get to work. In some cases where we tried to make deliveries, the customers' driveways were blocked with snow."

With mills and distributors rushing shipments to users to hold their business, the bad weather resulted in some strained relations.

"Right now, we're working hard to keep buyers happy with fast deliveries," says a service center manager. "In one case a customer was getting edgy because of previous delivery delays. Then a truckload of steel going to him skidded in the snow and went off the road."

While they can't directly point to any business lost because of the weather, steel mills feel it has af-

How Snow and Cold Have Chilled Retail Sales



fected business. "Look at it this way," says a mill sales official. "In December, because of the bad weather and the holidays, most of our customers lost about a week of production time. That's almost a fourth of the month and it represents steel that wasn't used up and replaced."

For Pittsburgh area mills, the weather has hampered barge shipments on the Monongehela River. It also interrupted barge shipments of pipe to the Southwest.

Construction: Seasonal factors normally slow down construction during the winter months. But figures indicate both the bad weather and the recession have hurt construction more than usual.

Unemployed construction workers in New York state in December totaled 34,000, according to the state's unemployment office. December unemployment in 1959 was 13,000 and in 1958, 22,000. Between November and December, 1960, the number of construction workers idle climbed over 100 pct.

Freight Carloadings: Through December and January freight loadings kept running well below year ago rates. These are some of the declines, as reported by the Association of American Railroads: For the week ending Dec. 3, down 19.5 pct; Dec. 17, off 21 pct; Jan. 7, down 25.5 pct; Jan. 14, a decline of 14.8 pct; Jan. 21, down 16.6 pct, and Jan. 28, off 21.3 pct.

John W. Riday, business conditions analyst for Dun & Bradstreet, estimates about 5 pct of the 21.3 pct drop for the last week in January was due to the weather.

Railroad Views — A spokesman for the Reading Railroad says, "During the extreme cold of the last six weeks our freight loadings were off about 25 pct. We are a heavy shipper of both finished steel products and raw materials such as coal and ore for the industry. About 25 pct to 30 pct of our total freight is directly related to the steel industry."

Defense Contracts Spread More Evenly

Smaller companies got bigger defense contracts in fiscal 1960.

The aircraft and missile industry received the highest percentage of total defense spending.

■ General Dynamics Corp. was the leading military contractor again for fiscal 1960. It received $1260 million business.

The top 100 defense contractors and their 118 subsidiaries received 73.4 pct of the dollar volume of all contracts of $10,000 or more. Net value of these military prime contracts totaled $15,410 million.

Gradual Shift—Since 1958 there has been a significant shift of awards, from top companies to smaller contractors. Twelve of the top 25 companies received a smaller volume of awards in 1960 than in fiscal 1958.

The aircraft and missile industry again received the biggest percentage of total defense spending. Electronics contracts related to these programs placed second.

How They Stand—Of the top 100 companies, 65 are directly involved in research, development, test of production of aircraft, missiles or electronics. A large part of the electronics awards are related to aircraft, missile or warning and control system programs.

Eleven of the top 100 are oil companies. Eight are construction companies and four shipbuilders. Of the remaining 12 companies, four received awards for missile fuels, ammunition loading, or chemicals; two for trucks or other vehicles; two for transportation services; and four for various research, development and testing services.

Three of the top 100 are educational or other non-profit institutions.

Subcontracting Awards—A large portion of prime contract funds received by the top 100 companies was subcontracted out to other companies. Companies which submitted subcontract reports to the Dept. of Defense for fiscal 1960 accounted for 90 pct of all prime contract awards to all 100 companies. These reporting companies subcontracted more than one-half of their receipts for military work.

Top Ten Get Less Business

(Millions of Dollars)

1959		1960	
General Dynamics	$1616	General Dynamics	$1260
Boeing Airplane	1167	Lockheed Aircraft	1070
North American Aviation	1018	Boeing Airplane	1008
General Electric	914	General Electric	963
Lockheed Aircraft	899	North American Aviation	907
Douglas Aircraft	676	The Martin Co.	596
United Aircraft	538	United Aircraft	517
The Martin Co.	524	American T&T	466
Hughes Aircraft	494	RCA	405
American T&T	477	Douglas Aircraft	404

Auto Strike Hinges on Sales

First Half Economic Conditions Hold the Answer

A big question in the Motor City today: Will the UAW go out on strike this year?

It could. But automakers don't feel it would hurt them too much. The real answer is in the economic conditions.
By A. E. Fleming

■ Will there be a strike against the auto industry in this contract year? The answer may lie in whether economic conditions get better or worse in the next five months.

If things don't get better, if new car sales fail to gain, if inventories stay high—in short, if the recession is not corrected—a strike is not likely.

These conditions were present in 1958. The United Auto Workers didn't strike, although there were one-day walkouts at General Motors Corp. and Ford Motor Co. before agreements were reached.

Possibility?—What is the possibility of automakers again saying, "Let them strike. Our dealers have enough cars to last a couple months. Sales aren't so hot, anyway?"

It happened three years ago. "It wasn't an honorable out," says a UAW spokesman. "We knew they didn't need production, that a strike would last a long time if our men walked out in June. We sat tight, settled for layoffs and got unemployment pay."

Will the same thing happen again? "It's possible," he says. "It looks like new car inventories will be high this spring. Walter (Reuther) thinks the economy this summer will be pretty much like 1958."

In Good Shape — Under such conditions, automakers would be in good shape to take a strike. And if they wanted to, they could possibly step up car output in their expanding overseas plants, increasing imports into the U. S. to fill inventory holes if they developed.

If an industry-wide strike should develop, it could put from 518,000 to 525,000 UAW members out of work. Membership includes 310,000 in GM plants, 115,000 to 120,000 at Ford, 60,000 at Chrysler Corp., 25,000 at American Motors Corp., and 8000 to 10,000 at Studebaker-Packard Corp.

The UAW hasn't come up with its 1961 demands yet. Special executive board meetings have been underway, mopping up odds and ends that came out of various regional meetings in November and December.

March Meeting—A regular executive board meeting will be held in March. It's possible some definite bargaining points will be developed then. But, to get any play UAW chiefs would likely send up a trial balloon to test the reaction of rank and file membership, the automakers and the public. In the past, the profit sharing plan was one such trial balloon. Another shot at profit sharing, a proposal for salaries for hourly workers or a 30-hour week for 40 hours pay might set the UAW to searching for headlines in March.

If nothing big comes out of the March meeting, it will in April. A special board meeting will be held April 19, with a special bargaining convention following April 26. Plans are sure to be set by this time.

The "Big Three"—UAW's "Big Three" departments will follow up with national council conferences in Detroit a few weeks later: GM on May 17-19, Chrysler May 18-20 and Ford May 24-25.

Right now, UAW researchers and

REPEAT PERFORMANCE?: Louis G. Seaton, GM vice president-personnel (left) and UAW president Walter P. Reuther opened auto industry labor negotiations in April, 1958, with a handshake and light banter, then stalled for four months. It could happen again this year.

economists are working with members of the UAW "Big Three" sections on various possible programs. Any new ideas they come up with are turned over to the boards. They are going over the pension programs, for one thing, finding out how the present plan is working out, seeing if it can be broadened, and how much money is in it.

What will they possibly bargain for? In the past year, the slogan "Thirty hours work for forty hours pay" has been getting louder. Some leaders want it to be at the top of the list when bargaining starts.

Past Failure—In 1958 the UAW came up with the profit sharing plan. It failed under pressure of the recession and unyielding opposition by the automakers. The UAW promised it wouldn't forget the plan.

Solving the unemployment problem has been a popular topic at every union gathering. Indications are it will be a key theme this summer, if not in the form of a shorter work week, then some way to make more jobs available to more men.

Just the Same—This is not to say a wage boost won't be sought. But it probably won't be more than the 30-cent package gained in 1958. Fully-paid insurance (companies now pay 50 pct), pension increases and earlier retirement may also be factors in the program.

The recent Kaiser Steel Co.-United Steelworker developments have stirred the UAW. They suggested that the public be represented in future labor-management negotiations as a means of preventing strikes. "These were ideas proposed by Mr. Reuther to automakers sometime ago," according to the UAW spokesman. "It looks like these plans are being considered again. Now that others are bringing them up, it will give us a chance to propose them again."

But regardless of what the union comes up with in the way of demands in the spring, Mr. Reuther will see to it that he has enough flexibility to change them at the last minute if economic conditions warrant revisions.

Metal Can Market Keeps Growing

After a lapse last year, the can industry is preparing for bigger sales this year.

Aluminum persists to be the big threat to tinplate.

By K. W. Bennett

■ Can makers, recovering from a backward step in 1960, are looking ahead to high levels again this year. But it still shapes up as a market battle between metal producers.

Predictions are that the U. S. will consume almost $1.7 billion worth of cans before the end of 1961. This would be 2.5 billion cans more than last year and equal the 1959 record of 44.5 billion cans.

According to the National Canners' Assn., carryover stocks of canned foods are at a four-year low.

What is the metal outlook for the can industry this year?

More Tinplate—R. D. Weinland, general manager of purchasing, Continental Can Co., told The IRON AGE: "We fully expect to use more area of metal sheet in 1961 than we did last year. This includes standard tinplate, double-reduced tinplate, and aluminum. Notwithstanding an expected increase in the use of aluminum, our overall metal requirements will mean an increase in the use of tinplate as well."

The word "area" is significant. It implies that double-reduced tinplate is coming along rapidly enough to lead can makers to expect more cans per ton of steel this year. Under the right conditions, one producer estimates, light-weight tinplate could increase the number of cans per ton of steel by 50 pct.

Confident — Some can industry sources appear confident that they can count on at least 10,000 to 15,000 tons per month from each of three steel companies during the first half. At least seven steelmakers are preparing now to enter the market.

There are guesses from the industry that 1961 could mean as much as 30 pct of the can market going to light tinplate. The push will probably be made in the area of citrus juices. Double-reduced beer cans are expected by summer.

Aluminum, however, is still the driving force in the can industry. And, contrary to the beliefs of other metal producers, aluminum is aiming at nearly every can market.

Seafood Markets — Reynolds Metals Co., for example, is confident that it has the citrus concentrate market well in hand. It's now turning its efforts toward the seafood market. Plans that have been in the works since last summer (see IA, Aug. 4, '60, p. 150) were recently made public by Paul Dearborn, director of food packaging markets for Reynolds.

"Barring unforeseen obstacles," he says, "we expect the tuna fish industry to convert to aluminum in 1962 for the standard half-lb size." This market alone will total 600 million cans annually, says Mr. Dearborn. Several tuna packers are testing aluminum seamless cans.

Actually, aluminum enters the fight with its biggest marketing year ahead. J. F. Delaney, Kaiser Aluminum & Chemical Corp., notes, "The output for aluminum cans in 1961 is extremely encouraging. We anticipate this market will more than double over last year."

Can makers are watching the battle between aluminum and steel with great interest. Comments one: "This fight is just what we needed. It's gotten both the can industry and the steel industry off their chairs. We're getting new ideas in every branch of the business."

Fast Computer Gives Big View

"Brain" at Westinghouse Unifies Functions

The East Pittsburgh works of Westinghouse Electric Corp. uses an IBM 7090 computer that integrates production, accounting and other operations.

Fast, versatile "brain" is used for data processing and engineering computations.
By G. J. McManus

■ A new computer and a new concept are pulling together separate business functions at the East Pittsburgh works of Westinghouse Electric Corp.

East Pittsburgh is using an IBM 7090 to integrate design, production, accounting and other types of plant information. In taking this unified look at separate operations, Westinghouse has gone to a computer that offers high speed plus the ability to handle both technical and business problems.

These are key qualities in the current phase of the company's computer program. Westinghouse has been moving ahead rapidly with the order entry part of this program. All orders for shipping stocks go by teletype to a random access computer in Pittsburgh. The computer picks out the best source for an item and shoots out shipping instructions.

INFORMATION CENTER: Warren Hume, vice president and midwestern regional manager for IBM (left), and A.C. Monteith, vice president, apparatus products, Westinghouse Electric Corp., talk over the IBM 7090 computer at the latter's East Pittsburgh Computer Center.

Other Computers—In the apparatus group, 85 pct of all orders will be processed on electronic and teletype systems by the end of the year. Computers are being used for many other functions at Westinghouse. East Pittsburgh and other locations are using the machines for research, design, inventory and other problems.

The new effort goes beyond other plant programs in the range of order processing elements it will attempt to unify. Plans call for engineers to crank live cost figures into design programs for the 7090. Accounting and design details are seen going into production planning problems.

These moves involve more than just rapid calculation. Plant supervisors at East Pittsburgh are being schooled to think along the broad lines of the computer. Within the computer center, the dividing line between commercial and technical is becoming blurred. Isolated decisions are giving way to broad-gage optimizing.

New View—The change represents a complete new viewpoint, says T. H. New, manager, business systems department, East Pittsburgh.

"The first breakthrough came when we realized engineering was part of the business," says Mr. New.

"And vice versa," says D. Breedon, who heads up the engineering programming group in the computer center.

Explaining the need for broad thinking, Mr. Breedon points to the East Pittsburgh use of a computer to design induction motors. The machine juggles various design elements and comes up the combination that gives best performance at lowest cost.

To make the right selection, says Mr. Breedon, the computer must have exact, current accounting

dope. If a situation permits the use of either copper or steel, the computer must have an up-to-date reading on prices of these metals.

Machine Briefing—He points out, also, the electronic device should be briefed on production considerations. If it is to choose between an iron casting and a formed steel part, it should know something of the machine shop schedule.

Announced by IBM in 1958 and now operating in a handful of government and company locations, the 7090 is six times faster than an IBM 709 and 7½ times faster than a 704.

The increased power means less cost per computation. One of the earlier computers at East Pittsburgh could add 2000 numbers in one second. This unit rented for $25,000 a month.

The 7090 adds 225,000 numbers a second; it rents for $65,000 a month. In other words, the new unit is more than 100 times as fast while costing less than three times as much.

Adds to Capacity—In addition to giving a lower unit cost, the 7090 adds to the computer capacity at East Pittsburgh. The 704 model, which is being replaced, was loaded on a full 24-hour basis with engineering work. Same load is being handled in 6 hours a day by the 7090.

Westinghouse will use the flexibility of the 7090 to get a broader view of different functions. However company officials say this does not mean there will be any centralizing of decisions or organization.

Training Games—The company is working, though, to get supervisors tuned in on the integrated approach to decisions. At East Pittsburgh two separate training games are being employed for this purpose. One is for front line production supervisors. It gives players variables like overtime, inventory and machine loading to manipulate. The computer takes decisions and traces the full effects. A general management game works in the same way.

U.S. Sinter Experts Needed Overseas

■ The wave of iron ore beneficiation now at high tide in the U. S. steel industry is spreading to Europe and Japan. Foreign steel producers are looking to the U. S. for assistance in building sintering plants to upgrade lean ores. U. S. know-how is being drawn upon heavily, despite far lower engineering and labor costs overseas.

Major U. S. firms involved, mostly through foreign partners and licensees, are Koppers Co., Inc., and Dravo Corp. of Pittsburgh and McDowell Co., Inc., and Arthur G. McKee Co. of Cleveland. Steel firms with overall technical assistance contracts can also be included.

20-25 Now Planned—There are about 20-25 sinter plants in various stages of planning or construction in the European Common Market. Included are six more French sinter plants and 12 German ones. There are inquiries from Iron Curtain countries, but no indications Russian engineers are bidding for jobs.

Koppers licensees in Germany, England, Japan and Canada are now building over 10 plants.

Dravo is a switch on the usual pattern, being the U. S. licensee of Lurgi Co. of Italy. Lurgi has over 30 sintering jobs going through its plant, including plants for cement and fly ash.

McDowell is working on four major sintering plants for overseas, three for Europe and one for Japan.

And McKee's partner, Head Wrightson Co. of London, "has built as many sintering plants over there as McKee has in the U. S.," says Merrill Cox, vice president.

Expanding Demand—The trend to beneficiation parallels that in the U. S. Foreign mills generally have run out of good iron ore.

With steel demand expanding fast, they must beneficiate the remaining lean ore and also depend on foreign ores being shipped in. The new one-million-ton French mill at Dunkirk, site of the historic evacuation in World War II, will operate entirely on water-borne foreign ore.

"To meet the competition on its own terms," says Mrs. Robert McDowell, secretary-treasurer of McDowell Co., "we worked through foreign licensees who did the sales job and are constructing machinery and building plants to our design."

Japanese Scrutiny—"The interest of the Japanese especially, in our technology is unbelievable. The automation in Japanese mills is fantastic. Their engineers work out excellent in carrying out the details of projects. When our engineers go over there the Japanese are lined up three deep to ask questions and soak up all the know-how they can," says Mrs. McDowell.

The European upgrading comes mostly from the gradual depletion of the native ores by war and industrialization.

"Mills in Europe used to be right on top of the mines, but these are now pretty well exhausted," says Mr. Cox.

"Most of the European steel industry will eventually be operating on ore from Venezuela and other world markets as well as on imported coal.

Full Development — "They also have learned that fully prepared blast furnace burdens pay off, so are working to develop ore concentrating facilities more fully. This has resulted in the present rash of sinter plants going in, generally at the mill site where reclaimed flue dust can be also utilized."

The New Formula for Economic Recovery

Besides action for "price stability," President Kennedy's "program for economic recovery and growth" calls for:

An increase in the minimum wage floor from $1 to $1.25 an hour over a two-year period with coverage extended to several million workers.

Reduction of mortgage interest rates by lowering the top rate on FHA-insured loans from 5¾ to 5½ pct. He believes this will stimulate home construction.

Enactment of area redevelopment legislation "without delay."

A modification of income tax laws to provide additional incentives for investment in plant and equipment.

Immediate distribution of $724 million in Federal highway funds.

Review by all U. S. agencies of buying and building plans to step them up wherever possible and to channel more contracts to companies in depressed areas.

Are Price Controls Coming?

The President's Comments Point in This Direction

President Kennedy has called "price stability" absolutely necessary for a sound U. S. economy.

His newly-formed labor-management advisory group is to take a hard look at prices.
By R. W. Crosby

■ What will John F. Kennedy's plans for "price stability" cost industry? Evidence is piling up that the cost may be Federal control of industry pricing practices.

The latest evidence appears in President Kennedy's program for economic recovery and growth. In his message to Congress on this program, the President calls "stability of prices" absolutely necessary for a sound U. S. economy. He says:

Labor and Management — "The course of the American price level depends in substantial measure on wage and price decisions of labor and management.

"We cannot afford unsound wage and price movements which push up costs, weaken our international competitive opposition, restrict job opportunities, and jeopardize the health of our domestic economy."

The President does not say he wants government price controls. He wants only "price stability." But when he talks about stability, "sound wage policies and sound price policies" are mentioned in the same breath. But the evidence is not in these words alone.

President Kennedy, in his economic message, reveals he is issuing an executive order establishing a President's Advisory Committee on Labor-Management Policy, with members drawn from labor, management, and the public.

Purpose of Group—What is the purpose of this group? Besides promoting "free and responsible collective bargaining and industrial peace," the Chief Executive says "the committee is directed to advise the President with respect to actions that may be taken by labor, management, and the public which will promote . . . sound wage policies, sound price policies and stability."

"I look to the committee," he says, "to make an important contribution to labor-management relations and an understanding of their importance to the stability of prices and the health of the economy."

These words don't say "price control." But could they be the fulfillment of the promise made in the Democrat platform on which Kennedy was elected? The platform promised "action to restrain 'administered price' increases in industries where economic power rests in the hands of a few."

The President says, also, that unsound wage and price movements "weaken our international competitive position." It is an innocent statement, yet it came at the exact time that Senator Estes Kefauver announced his Antitrust Subcommittee would investigate metalworking industry pricing practices and their effect on world trade.

Steel—This is the same Sen. Kefauver who last year warned that: "Because the steel industry is so important to the American economy, the subcommittee feels that it must continue to observe and study the administration of prices in this industry . . ."

Planning Shows in Steel Earnings

In Spite of Steel Recession, Profits Aren't Bad

The pattern of sales and profits varied throughout the industry last year. For many companies, results were better than could be expected.

It will be more of the same this year. Any improvement in profits will result from tough competition.

By R. D. Raddant

■ Most steel companies did a good job of making the best of a sales recession in 1960. But they face just as tough a time looking ahead through this year.

Few steel executives think more tonnage will be poured this year than last. The scramble for sales and profits will have to occur within the limits of 95 to 98 million tons of steel.

Each company is now faced with the dual problem of getting a larger share, and of managing that share more efficiently. That is, if it hopes to improve on its 1960 profit position.

Proud Records—But in spite of the sad order picture in the last half of 1960, many steel companies showed records to be proud of.

U. S. Steel Corp.'s earnings of $304.5 million were well over 1959's. And the corporation showed a creditable 8.2 pct return on sales while operating at an annual rate of 65.1 pct of capacity.

Jones & Laughlin Steel Corp. showed a net income of 12 pct higher than in 1959 on a sales increase of 2 pct.

By and large, the industry showed it could take a period of attrition and make the best of it. Many companies indicate capital improvements made recently now put them in a position to show even better results on the same scale of operations.

High Hopes—But the outlook for 1961 indicates more of the same: Tough scrambling for sales and more hopes than solid indications of a mid-year pickup.

L. B. Worthington, U. S. Steel president, says the low rate level of steel inventories is no more than a mere 10 million tons. This, he implies, is little, if any, higher than at the end of the steel strike back in late 1959. The logic is hard to dispute. Even at a relatively low rate of steel consumption, low inventories may be the strongest factor working for better operations.

Certainly the rate of new orders does not indicate it. Most steel executives say they "sense" a better feeling. Or, they say they have observed a moderate pickup in general steel orders. But they admit their order picture is little different from what it was last June.

More Problems—Added to the problem are higher employment costs, charges for carrying inventories of finished steel, the expense of prompt (almost over-night) deliveries, absorption of some extras and other charges.

This is in the face of no increase in steel prices since mid-1958. It is almost three years since there has been any price relief, although most direct costs have climbed.

But, at the same time, cost-cutting equipment, better melting and rolling facilities, and many other results of capital spending, have made it possible for the mills to combat higher costs and hold the line on earnings.

As a result, most companies, even in a period of uncertainty, are continuing capital spending as much as possible. It's aimed at improvement, of course, with added capacity almost incidental.

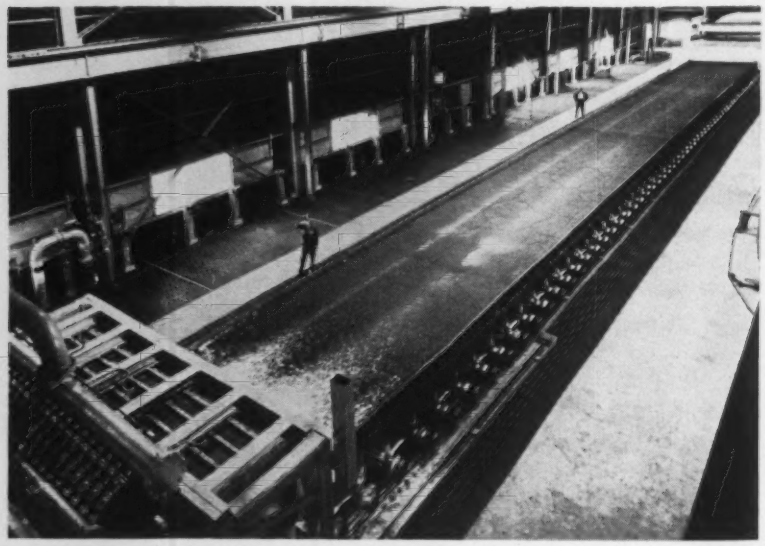
Steel Earnings: 1960 Vs. 1959

A Year of Attrition

COMPANY	1960 EARNINGS	1959 EARNINGS
U. S. Steel	$304,520,681	$254,563,401
Bethlehem	121,179,549	117,235,859
Republic	52,846,373	53,890,116
Jones & Laughlin	33,153,000	29,485,000
National	41,937,235	54,897,360
Inland	47,050,611	48,354,030
Armco	70,459,000	77,064,249
Youngstown Sheet & Tube	25,719,166	30,956,040
Colorado Fuel & Iron	1,196,625*	4,364,554
Wheeling	8,277,000	7,033,000
Crucible	1,240,000	6,106,443
Pittsburgh Steel	1,026,475	994,310*
Kaiser	8,215,842*	7,401,076*
Granite City	11,121,000	16,142,000
Allegheny Ludlum	8,750,209	11,290,664
Alan Wood	1,437,000	4,856,000
McLouth	16,418,934	10,058,232
Copperweld	2,441,781	5,972,457

*Indicates Loss

Sinter Line Size Sets World's Record



IT'S THE GREATEST: Jones & Laughlin Steel Corp. is operating the largest single-strand sinter line in the world at Aliquippa, Pa. It can produce over 225,000 net tons per month of high quality sintered ore charge for blast furnaces. Shown is the ignition furnace (left), and the hearth, which is the world's biggest with a 2419 sq ft area. Its width of 13 ft, 2 in. is the widest in the U. S.

First Power Produced From Niagara Project

First power from the $720 million Niagara Power Project will be produced February 10, after three years of construction.

Westinghouse Electric Corp. is building 13 more waterwheel generators at the Niagara Falls, N. Y., site, making the Niagara project the largest hydro development in the western hemisphere. The units all will be operating by April, 1962. The generators were built at the Westinghouse East Pittsburgh works for the New York State Power Authority.

Biggest Crane—A giant 630-ton traveling crane, most powerful ever built, is used to handle parts during assembly and installation work. The generators are being assembled in an erection bay at the Niagara plant.

Each generator weighs 2,230,000 lbs and is rated at 150,000 kw. Niagara's units when completed will have a total capacity of 2,190,000 kw. The Robert Moses Niagara Generating Plant is about 1840 ft long and towers 389 ft from the lowest point to the top of the intake.

U. S.-Canada Pact—A treaty between the U. S. and Canada limits the amount of Niagara River water that can be used for power. But power will be produced at 13,800 v and transformers will step this up to 115,000, 230,000, or 345,000 v as required.

$20 Million Iron-Steel Project Begun in B. C.

Consolidated Mining & Smelting Co. has opened the first phase of a $20 million iron and steel production project at Kimberley, B. C.

Pig iron production has begun. It eventually will reach a full capacity of 100 tons per day. It's the first iron to be made in Western Canada from western ore.

Cominco's Kimberley project will be an integrated operation. It will produce at least 300 tons per day of pig iron, steel ingots, and basic steel products. A $7.5 million sintering plant and electro-thermic furnace plant is now operating.

Stockpiles Used—Cominco's Sullivan Mine at Kimberley is supplying the iron concentrate. More than 15 million tons of iron have been stockpiled. The new plant gets power from Cominco's hydroelectric plants in the West Kootenay district, coke from the Crowsnest Pass and lime from the Kootenay River Valley.

The highly-instrumented plant was designed for maximum quality control. Cominco will market the iron in Canada and the U. S.

Over 125 Seek Award For Miniaturization

Industry's biggest contest on smallness, the Miniaturization Awards, has drawn a record number of entries. This was reported by Horace D. Gilbert, committee chairman and president of Miniature Precision Bearings, Inc., Keene, N. H., sponsor of the awards.

More than 125 entries will be judged by the Awards Committee, a nine-man group which includes George F. Sullivan, Editor of IRON AGE, and experts from the fields of business, government, university education and publishing.

Mr. Gilbert indicated a large number of entries in the medical field, where miniaturized instrumentation for surgery and diagnosis has had extremely rapid growth in recent years.

Automation Report Is Given to President

A report to President Kennedy —compiled from union statistics— says that employment in the steel and auto industries is suffering badly from effects of automation.

The report, made by Rep. Elmer J. Holland (D., Pa.) says that automation in the steel industry has enabled 12 men to produce a ton of steel, compared with the 21 men needed 20 years ago.

Rep. Holland, a member of a Pittsburgh Steelworkers local, also claims that 160,000 unemployed autoworkers in Detroit "will never return to automobile factories due to automation."

INDUSTRIAL BRIEFS

Move to Mexico — American Brake Shoe Co. has joined with a Mexican firm to build a million-dollar foundry subsidiary in Mexico. Tighter import restrictions spurred the formation of the subsidiary, Amsco Mexicana, S. A. The plant will supply the Mexican market with high quality carbon steel and manganese steel castings.

On the Alert — If auto manufacturers turn to gas turbines, one company will be prepared. Wyman-Gordon Co. of Worcester, Mass., has formed a special group to concentrate on commercial, as well as military, uses of the gas turbine.

On their Own — Two former General Electric Co. analysis specialists have formed a professional consulting firm. It will provide value analysis training and consulting services to industry. R. E. Fountain is president and John F. Prendergast, vice president-treasurer.

New Team—Pettingell Machine Co., Lakeport, N. H., has been acquired as a subsidiary by Browning Laboratories, Inc., of nearby Laconia. Pettingell will still manufacture its line of motorized bumping hammers and rotary shears. It will also produce all metal parts, chassis and cabinets for Browning.

Prices Spread—General Electric Co. has revised its pricing policy for large induction motors and synchronous motors and generators. The new policy involves changes by ratings. It results in a range of price increases up to six pct and decreases of about 20 pct across wide lines of motor ratings from 150 to 50,000 hp.

Spreading Out—General Electric Co. plans a $4 million addition to its Computer Dept. at Phoenix, Ariz., this year. The new expansion will add 190,000 sq ft to the manufacturing and headquarters facility near Phoenix. The Computer Dept. is also building a $1.5 million computer development and research laboratory at Sunnyvale, Calif.

Eyes on Texas—Florida Wire & Cable Co. is moving into Texas. The prestressed concrete strand producer is picking a site for a Texas subsidiary. Manufacturing is expected to begin by June.

Southern Shift—Continental Gin Co., Division of Fulton Industries, Inc., is moving its warehouse and parts depot, now located at Atlanta, to Augusta, Ga. E. T. Walrond, district sales manager at Birmingham, will head the Augusta operation.

Bearing South—SKF Industries, Inc., has acquired a newly built plant in Asheville, N. C. It will aid increased production and sale of the "Expediter" railroad bearing and provide warehousing facilities. SKF is also seeking a site at Radnor, Pa., to locate a new multi-million dollar research laboratory.

Unique Expansion — The first affiliated company under a new corporate expansion plan is operating in Hawthorne, N. J. J. E. Johnson, former Nylok vice president of engineering, has set up Aerospace Nylok Corp. with a licensing agreement with The Nylok Corp., Paramus, N. J. Aerospace Nylok will specialize in self-locking threaded fasteners for the aircraft, missile and electronics field.

"Interoffice memo: All departments will please follow lead of management, and conserve heat."

Koppers Ovens—Donner-Hanna Coke Corp. has contracted Koppers Co., Inc. to build 50 coke ovens and auxiliary equipment at its Buffalo plant. The contract includes new coal handling installation and coal-chemical facilities.

Geared to Tomorrow — The Rome Cable Division of Aluminum Co. of America, East Los Angeles, is expanding. The division has set up a new electrical cable production unit, called the Special Products Facility.

Steamed Together — Westinghouse Electric Corp. has set up the small steam and gas turbine department. It was formed by the merger of the small steam turbine and industrial gas turbine departments.

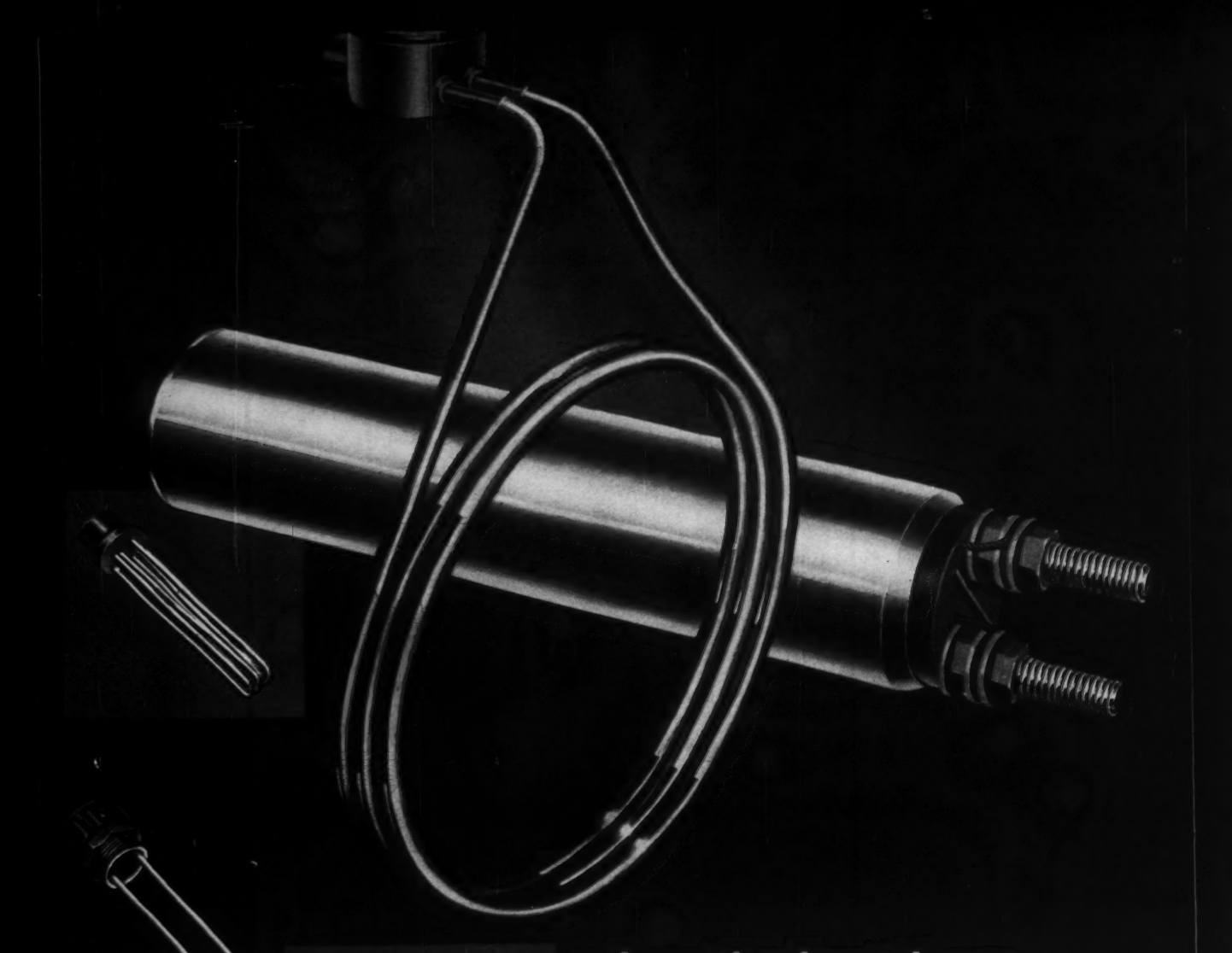
Precision Growth — Precision Metal Processing Co., Cleveland, has incorporated as a division of Kold-Lube Coaters, Inc.

Triple Territory—Carpenter Steel Co. has tripled its Los Angeles facilities with a new $300,000 mill-branch warehouse and specialty steel service center. Other Carpenter expansions include new service centers and warehouses in Cleveland and Philadelphia and a sales office in Dallas.

Boston Buy—Bay State Electronics Corp., Boston, has acquired Van Norman Industries Electronics Div., Manchester, N. H. Research and development will be done at the Bay State Boston facility.

Weldment Widens—Stupp Bros. Bridge & Iron Co., St. Louis, has completed a 40,000 sq ft weldment department addition.

Quebec Start—Columbium Mining Products, Ltd., is building a 250-ton-per-day pilot plant at Oka, P. Q. The mill will produce 750,000 lb of columbium pentoxide annually.



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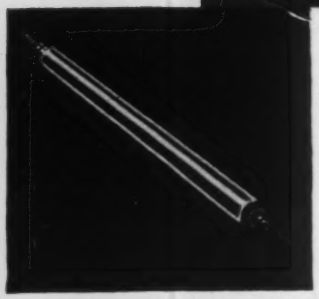
STAINLESS STRIP STEEL



Superior Stainless, chosen for exacting applications by Edwin L. Wiegand Company, Pittsburgh, Pa., serves this leading manufacturer of domestic and industrial heating units with every desired advantage. Corrosion resistance, strength, uniform ease of fabrication and surface finishing are matched with dependable Superior service the year around. • Call us for technical assistance and quotations on your own stainless strip applications without obligation.

SUPERIOR STEEL DIVISION

OF

COPPERWELD STEEL COMPANY

CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York

Good Communications Are Vital

Management is a lot easier if you can get, and keep, complete communication with employees and stockholders.

Developing an effective method of contacting shareholders is especially important.

■ You'll have fewer jolts along the business road if you can get—and keep—full, intelligent communication at all business levels.

With so much change in the air, keeping everyone keyed-in on management's thinking is vital. Department heads, employees, and stockholders must understand where you are going—and why.

Analyze, Then Plan—But getting the message across isn't easy. Each group must be reached in terms of its own interest. Each must be addressed in language it understands. Somehow, management's goals must be widened to become everyone's goals.

What's the answer? To successfully communicate, you must study, analyze, and then plan.

"Management should audit the effectiveness of its communications dollar as it audits every other function," says Howard Chase, president of Howard Chase Associates, Inc., public and economic affairs consultants.

"There is no status quo in idea flow. What served in 1960 may be wrong in 1961," he adds. "How many chief executives can tell you, or even find out in 24 hours, how many dollars their companies are spending on communications?"

Stockholder Relations — Among the groups you must reach, none is more important than stockholders. Effective contact with shareholders is an essential part of a sound financial public relations program.

Such a program must be based on a plan developed to suit your company's particular needs, one expert points out. He's David Skylar, vice president, the Griswold-Eshleman Co., Cleveland.

"Unless the responsibility for a stockholder relations program is assumed by top management, little will be accomplished," says Mr. Skylar.

Sell the Company—Building and holding the good will of security owners, or attracting new ones, is basically the same as selling a product, he adds. Only in this case the product sold is the company itself.

The most effective means of selling security owners are direct communications. In these, to some degree, stockholders expect to see the company in a good light. Therefore, effective communications depend entirely on how well the material appeals to a shareholder's motivating senses.

Keep It Up—In addition, communications must be continuous. Since some shareholders will be buying into the company as others sell, communications must be uninterrupted.

Keep Personnel Flexible

■ There's another group which must be completely advised on management's plans and programs: The personnel department.

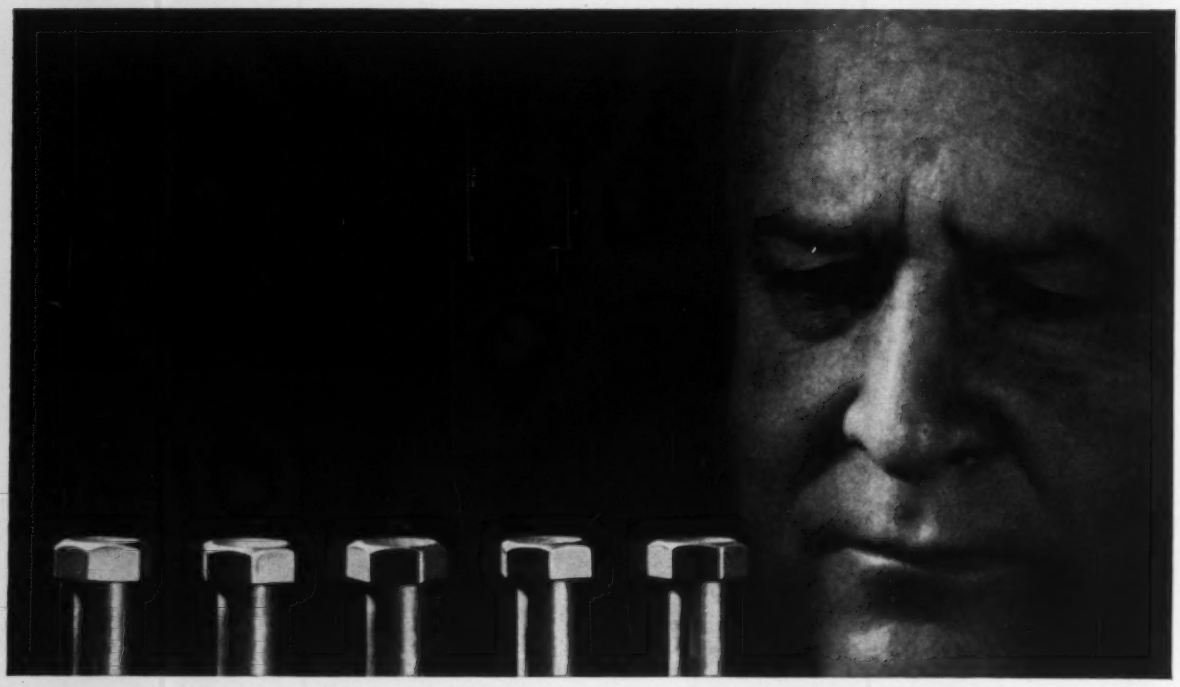
The best management idea will run aground unless manpower is available to carry it out. That's why personnel plans and programs must be geared to company needs.

Ask Questions—A large share of the responsibility, of course, rests with the personnel manager.

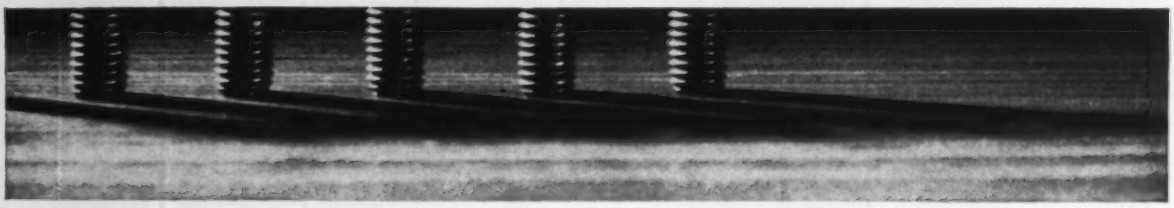
"Unlike many departments within a company," says Dr. George S. Odiorne, of the Univ. of Michigan, "the personnel manager must have sensing devices which tell him immediately what internal company needs must be fulfilled by his department.

"He must also be prepared to deploy his department staff to fulfill these needs, or anticipate them. The idea that personnel departments are organized and staffed in rigid postures is a dangerous one. It can only be defensible where the company itself is static and unchanging."

Why Changes Happen—He lists these forces requiring flexibility in personnel: Profit planning by management, company growth, organization changes, productivity demands, cost reduction moves, and environmental changes.



Heads for $50 saving per unit



Fastener survey of blower units by RB&W points out where use of standard hex screws cuts costs, but not quality

In making a survey of a well-known manufacturer's fastening operations, the RB&W man found that alloy socket head screws were used extensively in large blower units.

But he found no genuine engineering need – the alloy's strength wasn't being utilized. And he found no production need – there was no tight spacing situation that required internal wrenching. Nor was there even an *appearance* need – screws weren't being installed in countersunk holes for a flush fit.

So there was no purchasing need, either. Why pay the premium cost for alloy fasteners? He recommended switching to *standard* high strength hex screws. The savings in fasteners per blower: 50 dollars. That's 50 dollars added to unit *profit* with no increase in price.

An RB&W Fastener Expert is no better than your engineers. He simply knows *what* to look for. Why not let him search for savings with one of *your* engineers? Maybe you're doing the best possible; but unless you're sure you're not wasting fastener dollars, it pays to consult Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales office and warehouse at:** San Francisco, Calif. **Sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas. **Sales agents at:** Cleveland; Milwaukee; New Orleans; Denver; Fargo. **Distributors coast to coast.**

Chrysler Plugs Aluminum Engine

In production since September, little has been said about this six-cylinder engine.

But the company now apparently feels it has all of its manufacturing problems solved.
By A. E. Fleming

■ Apparently satisfied that manufacturing problems are licked, Chrysler Corp. is starting to publicly plug its aluminum engine.

First word comes from Dodge general manager B. J. Nichols, who announced that the 145 hp six-cylinder engine with aluminum block is available in Lancers.

According to Mr. Nichols, the aluminum block weights about 65 lb less than the 413-lb cast iron six.

Since September—Actually, production of the aluminum engine began at the company's Trenton, Mich., engine plant last September. It's machined and assembled on an auxiliary production line.

Cylinder blocks are supplied by the company's diecast plant in Kokomo, Ind. About 18,000 sq ft of floor space has been allocated at the plant to house seven new diecasting machines for the aluminum blocks. The machines have a die locking force above 2000 tons.

Reportedly, Chrysler hasn't turned out as many aluminum engines as it had hoped. But this hasn't been because of the engine. The reason is slow car sales. Original plans called for 15,000 to be made.

Seat Belts Are Back

Automotive safety belts haven't been a rousing sales success. In fact, they flopped in the mid-1950's.

Now Chrysler Corp. is going to try to stir up interest again. The company is offering belts on a nonprofit basis to dealers and wants the dealers to sell them at cost plus small installation fee to customers.

Price of the belt to the dealer is $6.35. Installation shouldn't be too hard. Chrysler, like most American cars, has embossed pads in the floor pan so the garageman can see where to drill holes for the belt anchors.

Trades and Trimmings

What kind of cars are being traded in on 1961 model Dodge Lancers and Darts? Standard low price cars, more than any other, are being cashed in on Lancers. Medium price cars are being traded in at the fastest rate on Darts.

Trade-ins on Lancers are 10.2 pct U. S. compacts and imports, 44.8 pct standard low price class, 39.7 pct medium price class and 5.3 pct others. Dart trade-ins run 3.7 pct U. S. compacts and imports, 43.8 pct standard low price class, 49.2 pct medium price class and 3.3 pct others.

Meanwhile the majority of all Buick Specials sold are deluxe models with automatic transmission, radio, heater and whitewall tires. About 59 pct are in the deluxe models. More than 21 pct have power steering, 75 pct automatic transmission, 67 pct radios and 74 pct whitewalls.

What New-Car Buyers Want

People apparently aren't afraid to spend money on extras when they buy compact cars.

Over 50 pct of Falcon buyers take automatic transmissions, 65 pct a deluxe trim kit, 44 pct whitewall tires and 27 pct the big engine. About 29 pct of Falcons sold are station wagons.

The same "luxury trend" is true for the rest of the Ford line. Galaxie, the top series among regular Fords, accounted for 45 pct of December sales compared to 36 pct a year earlier.

More Fords—Meanwhile, how is Ford coming along with its 96 in. wheelbase and 115 in. wheelbase cars which will come out this year? More and more Ford officials are hinting of their arrival.

Commenting on the wide variety of sizes and shapes of cars now available, L. A. Iacocca, Ford division general manager, says, "We see no reason to change this policy. In fact, market requirements may dictate more vehicles of even different sizes, shapes and performance characteristics."

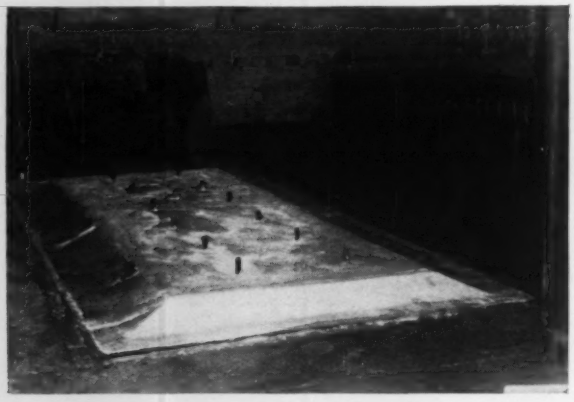
Popular Larks—What do Studebaker buyers buy? Most popular Lark has four doors, a six-cylinder engine, automatic transmissions and brownish-gray color.

The three leaders in Lark body styles continue to be 4-dr sedans, 2-dr sedans and 4-dr station wagons. The new Lark Cruiser is in fourth place. The 113 in. wheelbase model is accounting for almost 10 pct of Studey car sales.

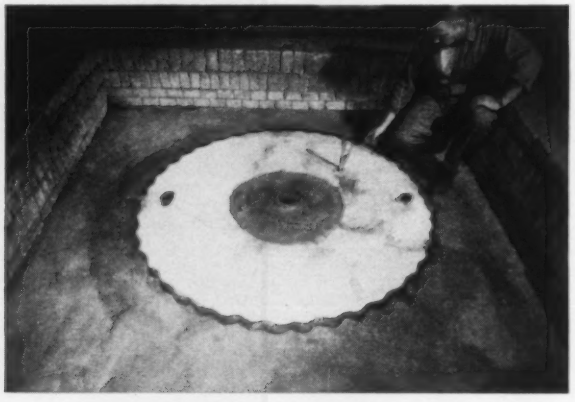
Six-cylinder models are taking 62.5 pct of 1961 Lark sales compared to 53.4 pct in 1960 model year. The percentage is going up steadily. Automatic transmissions are going into 50 pct of Larks, up 10 pct over a year ago.

B&W Kaocrete-D, vibrated in place, provides high resistance to the atmospheres encountered in this coke oven door installation. Furthermore, the high erosion resistance and long service life without loss of strength of B&W Kaocrete-D add to its suitability in this application.

A typical monolithic curb wall construction in an annealing furnace using a carbon monoxide atmosphere. The greatly reduced number of joints in which sealing sand can penetrate prevents structural spalling of B&W Kaocrete-A upon heating and cooling. Being monolithic, gas leaks are practically eliminated.



A radiant tube annealing furnace with a base of Kaocrete-A, backed up with Kaolite-20, one of B&W's insulating refractory castables. This furnace operates at approximately 1700 F in a 65% CO atmosphere.



A stack annealing furnace with pedestals cast of B&W Kaocrete-A. The atmosphere is slightly above 8% CO. B&W Kaocrete-A offers strength, volume stability and resistance to carbon monoxide disintegration.

How B&W refractory castables perform in atmosphere applications

One of the difficult problems facing furnace builders and operators in the metals industries is the effect of atmospheres on refractory linings. That's why B&W offers several *specialized* refractory castables for this service, each possessing strength, volume stability and the refractoriness necessary to assure long, trouble-free service.

Take B&W Kaocrete-A, for example. Because of the careful selection and processing of special aggregates and other ingredients with low iron content, this material resists disintegration or other effects produced by high concentrations of CO or H_2 atmospheres. B&W Kaocast and Kaocrete-32 provide the same excellent service at higher temperatures while lightweight Kaolite-20 is outstanding as an insulating castable in atmosphere applications.

B&W Bulletin R-35A gives additional information on versatile B&W refractory castables. Write for your copy of this bulletin to The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, N. Y.

R832

B&W

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REFRACTORIES DIVISION

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.

Scientist Sees Boost in R&D

But He Says Even More Must Be Spent in the Future

A 15 pct increase in national research and development spending is the forecast of a California scientist.

He advocates even further R & D outlays for real revolutions in the business and financial fields.

By R. R. Kay

■ Here's a peek into the future.

In the next 10 to 20 years, every $1 million spent on scientific research and development will produce $100 million worth of new industrial products.

That's the prediction of Dr. Lee A. DuBridge, president, California Institute of Technology.

3 Pct of GNP—The California scientist says that he wouldn't think it illogical or unwise to spend two or three percent of our Gross National Product in research and development.

He goes even further, advocating that the Federal government "invest" 10 to 15 pct of its budget in R & D.

Dr. DuBridge says electronic computers are only on the threshold of great new achievements. Electronic automation of industrial processes is certainly one of the fast-growing developments.

Real Revolutions — The same holds true for business and financial procedures. He's confident that we'll see real revolutions in the television field.

The nation as a whole will boost its R & D spending by 15 pct very soon, Dr. DuBridge predicts.

An example of West Coast research progress is Kaiser Aluminum & Chemical Corp.'s new Can Technical Service Lab in Washington.

New States Are Soaring

What's doing in Alaska and Hawaii?

The brightest spot in Alaska's economy is its oil development.

The petroleum industry spent $31 million there last year. It will plow in just as much this year. And Japanese interests are well aware of the state's closeness to the steel furnaces of the Orient. They're eyeing Alaska's vast coal deposits.

Hawaiians' Eye—In Hawaii, industry and business are booming. Industrialists there look for even more growth.

Construction is reaching new highs. Last year it hit $270 million. But a gradual leveling-out in volume of building seems probable.

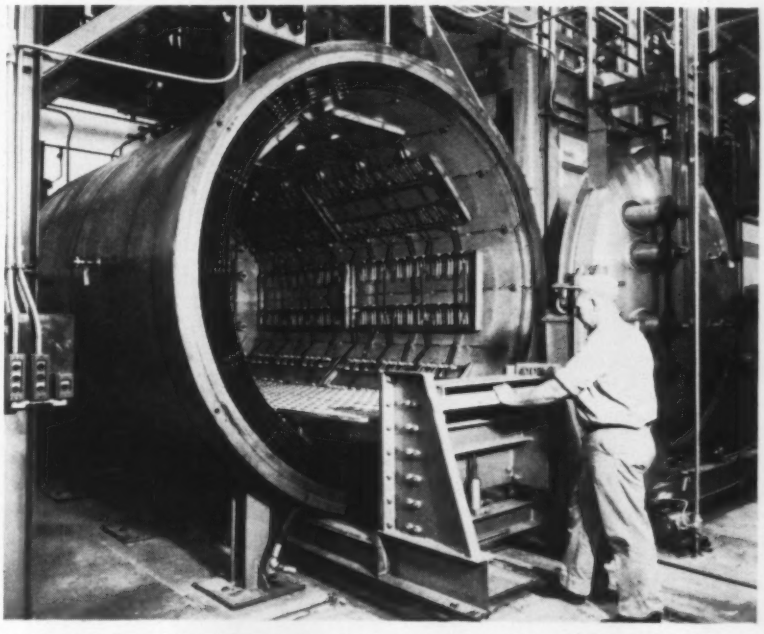
Trouble in the West

Not all is sweetness and light on the Coast.

In Washington, one out of every 13 persons is out of a job. And the State's Employment Security Department says unemployment will continue to rise during the year.

Why? Washington's labor force is growing faster than new job openings. Plant modernization and automation have created cells of unemployment.

Space-Age Furnace Heats Missile Parts



ONE OF THE BIGGEST: Steel alloys for the Atlas ICBM and Atlas-Centaur "high-energy" space vehicle are heat-treated in this new cold-wall vacuum furnace, one of the world's largest. Built by F. J. Stokes Corp. of Philadelphia for Convair (Astronautics) Div. of General Dynamics Corp., the furnace will heat treat metals to withstand missile flight temperatures.

Careful And Costly Control Grooms

SANDVIK SPRING STEELS

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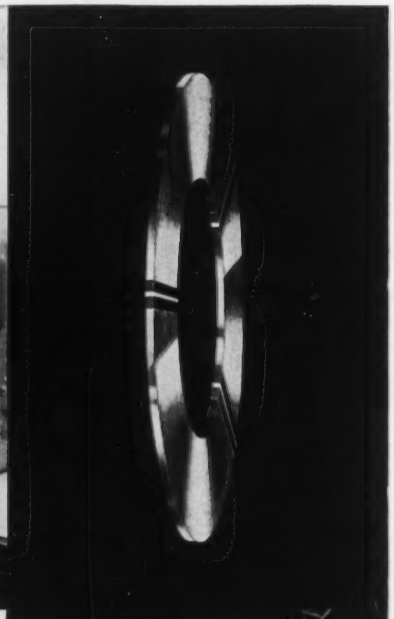
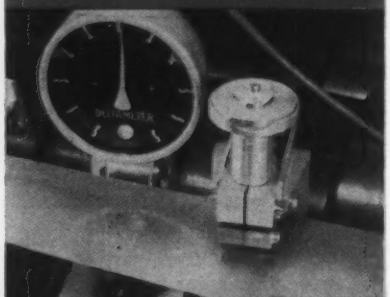
Smoothness of strip surface is checked with a "Talysurf" surface measuring instrument which registers the profile depth magnified up to 50,000 times.



Sandvik laboratories carry out over 200,000 chemical analyses a year.



Strip thickness is checked during rolling and at final inspection with a "Deltameter"

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From the ore in Sandvik's mines to the finished strip, Sandvik applies constant, rigid quality control to every steel-making step. Special analyses, careful, small-lot processing, modern laboratories equipped with special scientific instruments... these are behind Sandvik's record of success in tough spring steel applications.

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Industry Outlook Brightens

Government Survey Forecasts a Pickup in Orders

A Dept. of Commerce study brightens the outlook of the machine tool industry. It says 1961 should bring more orders.

Reason: Previously low levels mean many tools are now obsolete. Also, more government orders are expected.

By R. H. Eshelman

■ According to a recent U. S. Dept. of Commerce study, the outlook for the machine tool industry is far from black for the year ahead.

Taking a long look at trends in cutting and forming types of equipment from 1952, the government authorities foresee some positive factors ahead. These may give orders a lift in the second half, Phil Bennett, director of the Metalworking Equipment Div. believes.

One factor is that U. S. consumption of machine tools has been at abnormally low levels since the second half of 1957. That means an increasing number of tools in use are becoming obsolete. On the basis of advanced technology, greater unit productivity and precision, an even larger number of machines can be considered out-of-date. The spate of new developments unveiled at the machine tool exposition should stimulate modernization and replacement orders in 1961.

Government Spending — Even more certain is that the government's modernization and replacement programs will be stepped up in 1961. During the 1955-1960 period, the Armed Forces, especially the Air Force, have been quietly disposing of excess machine tools at an annual rate of nearly 23,000 units.

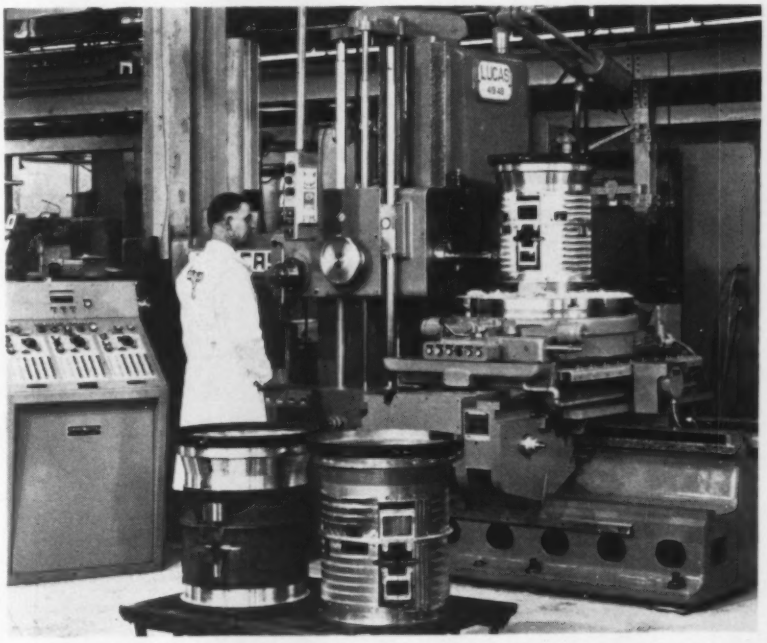
Some returns are already in on this program. Bendix Industrial Controls reports that in December its new orders ran over $1 million. Today its backlog is running from nine months to a year, and it has again boosted manufacturing capacity.

Many of these orders can be traced directly to the increasing impetus of the Air Force modernization program, with its emphasis on tape-controlled machining. However, at least one tool producer is also reported focussing plans for the future on economy models of tape machines, presumably for the general metalcutting field.

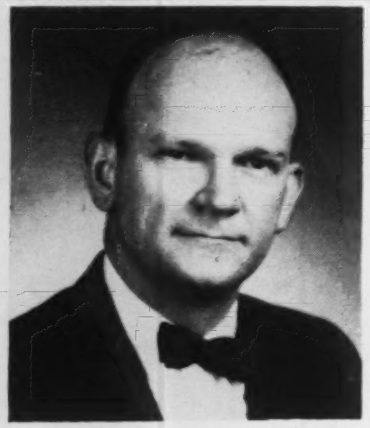
Not All Good—The Commerce Dept. says, however, long-range outlook for export business is not encouraging. Foreign builders have been boosting their facilities; upped product quality. Their price advantage, too, poses a real barrier. In fact, government experts say any lessening of industrial activity in Europe, Asia or Japan could spur European machine builders to try for a larger share of the U.S. tool market.

In the past few days E. W. Bliss reports orders for over $1.25 million worth of presses in 600 and 800 ton size class. These are to go to a U. S. automotive manufacturer. At mid-month of January several big press builders said they held sizeable orders from abroad.

An Economical Solution to Complication



EYES ON NC: Tape-controlled Lucas horizontal boring unit at Sibley Machine & Foundry Corp., works on machining complicated magnesium missile hardware. It also cuts costs of major component parts.



F. S. Blackall III, elected president, The Taft-Peirce Manufacturing Co. He succeeds F. S. Blackall, Jr., who becomes chairman of the board, treasurer and chief executive officer.

Wheeling Corrugating Co.—**F. A. McClelland,** elected president.

Westinghouse Electric Corp.—**G. L. Wilcox,** elected vice president and asst. to the president.

The Fafnir Bearing Co.—**H. B. Van Dorn,** elected vice president, engineering; **H. L. Potter,** named director engineering; **R. P. Remorenko,** named asst. chief research engineer.

Harbison - Walker Refractories Co.—**E. A. Garber,** elected chairman of the board, and **A. B. Wilson,** elected president.

Inland Steel Co.—**F. G. Jaicks,** named vice president and general manager.

Interlake Iron Corp.—**T. F. Bell,** elected executive vice president and general manager; **R. S. Weygandt,** named secretary.

Handy & Harman — **M. W. Townsend,** elected executive vice president.

Dravo Corp.—**M. W. Robinson, Jr.,** named asst. manager, New Product Development Dept.

Kaiser Aluminum & Chemical Sales, Inc.—**W. M. Gibbs,** named marketing manager, industrial product markets.

Republic Steel Corp., Alloy Sales Div.—**D. A. Atwater** and **R. C. Grund,** named asst. managers, Massillon, O.

Consolidated Aluminum Corp.—**J. F. Price,** promoted to sales manager.

New Product Divisions, Illinois Tool Works—**H. B. Smith, Jr.,** named manager.

J. C. Rieger, elected president, Wilson Marine Transit Co.

Metals Div., Olin Mathieson Chemical Corp.—**J. W. Meddick,** appointed building and construction market development advisor.

Air Reduction Sales Co.—**N. F. Moody,** named eastern regional sales manager.

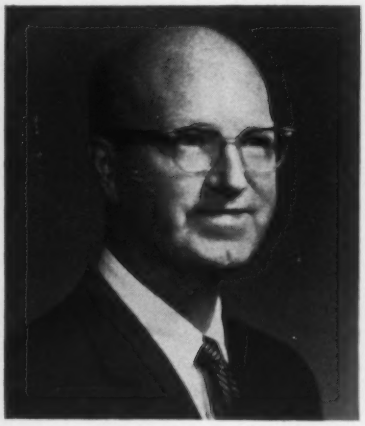
Luria Bros. & Co., Inc.—**R. J. Williams, Jr.,** named business research manager.

Amsler Morton Co.—**T. E. Roop,** named manager, furnace sales; **J. E. Dunn,** named manager, heat treat sales; **N. M. Pusateri,** will serve as manager of engineering.

United Air Lines—**Curtis Barkes,** becomes executive vice president, finance and property; **A. M. de-**

(Continued on P. 98)

P. L. Tietjen, elected vice president, traffic and transportation, Jones & Laughlin Steel Corp.



H. Q. Torrison, elected vice president and controller, Standard Screw Co.

M. M. Botnick, elected vice president, sales, Silent Hoist & Crane Co., Inc.

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THE OHIO STEEL FOUNDRY COMPANY
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Carbon Steel Rolls	Flintuff Rolls	Denso Iron Rolls
Ohioloy Rolls	Double-Pour Rolls	Nickel Grain Rolls
Ohioloy "K" Rolls	Chilled Iron Rolls	Special Iron Rolls
Nioloy Rolls	Forged Steel Rolls	

PLANTS AT LIMA AND SPRINGFIELD, OHIO. *Virtually at the center of the Steel Industry*

OR-44

(Continued from P. 96)

Voursney, named executive vice president, administration; **R. E. Bruno,** becomes vice president and treasurer, and **G. R. Harms,** becomes comptroller; **D. S. Ritner,** named vice president, employee development; **C. F. McErlean,** named senior vice president, law.

Aviation Products Div., The Goodyear Tire & Rubber Co.—**D. S. Howdyshell,** promoted to manager, contracts and cost administration.

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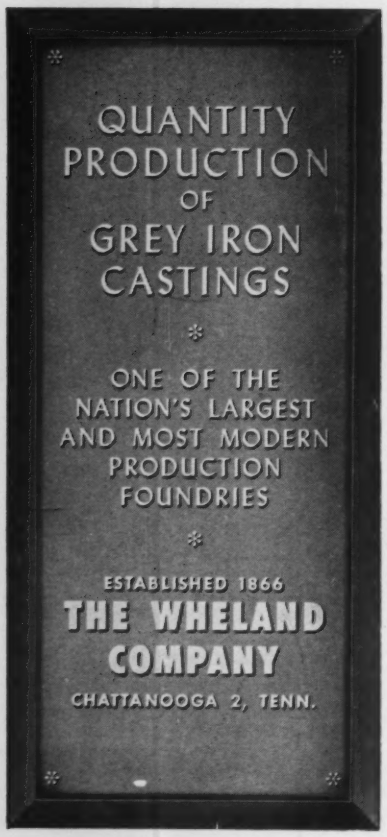
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ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES
ESTABLISHED 1866
THE WHELAND COMPANY
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Compressor Div., Fairbanks, Morse & Co.—**T. J. Bullock,** appointed director, marketing.

Marlin-Rockwell Corp.—**Daniel Lundquist,** appointed asst. sales manager.

Beryllium Corp.—**R. M. Whitaker,** elected secretary-treasurer.

D. W. Kaufmann, appointed product manager, stainless steels, Crucible Steel Co. of America.

Finished Products Div., Detroit Stamping Co. — **A. F. Gencur,** named asst. sales manager.

The Colson Corp.—**G. A. Jones,** appointed a vice president.

Stanley Steel Strapping, Div. of The Stanley Works—**W. M. Walsh, Jr.,** appointed sales representative, Vermont and western Massachusetts.

H. A. Sturm, appointed product sales manager, tool steel, Crucible Steel Co. of America.

Robert Penovich, named superintendent, Union Drawn Steel Div. plant, Beaver Falls, Pa., Republic Steel Corp.

The Austin Co.—**William Vanderhout,** appointed asst. general sales manager.

Sperry Products Co., Div. of Howe Sound Co.—**R. S. Peterson,** appointed product sales manager.

Joseph T. Ryerson & Son, Inc. —**R. L. Tisdale,** appointed manager, reinforcing products sales, Indianapolis plant.

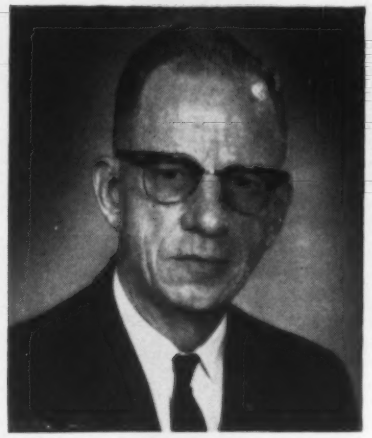
S. A. Seckler, named Chicago district sales manager, Republic Steel Corp.

U. S. Steel Corp.—**J. B. Parrish,** appointed asst. to manager, sales, Kansas City, Mo.

Stromberg-Carlson's Electronics Div.—**H. B. Miller,** appointed manager, newly-formed Electroacoustics

Advanced Development Laboratory.

J. W. Murphy, promoted to product manager, stainless steel sheets and plates, Sales Div., Allegheny Ludlum Steel Corp.



N. W. Stitt, appointed coordinator, customer service, Allegheny Ludlum Steel Corp.

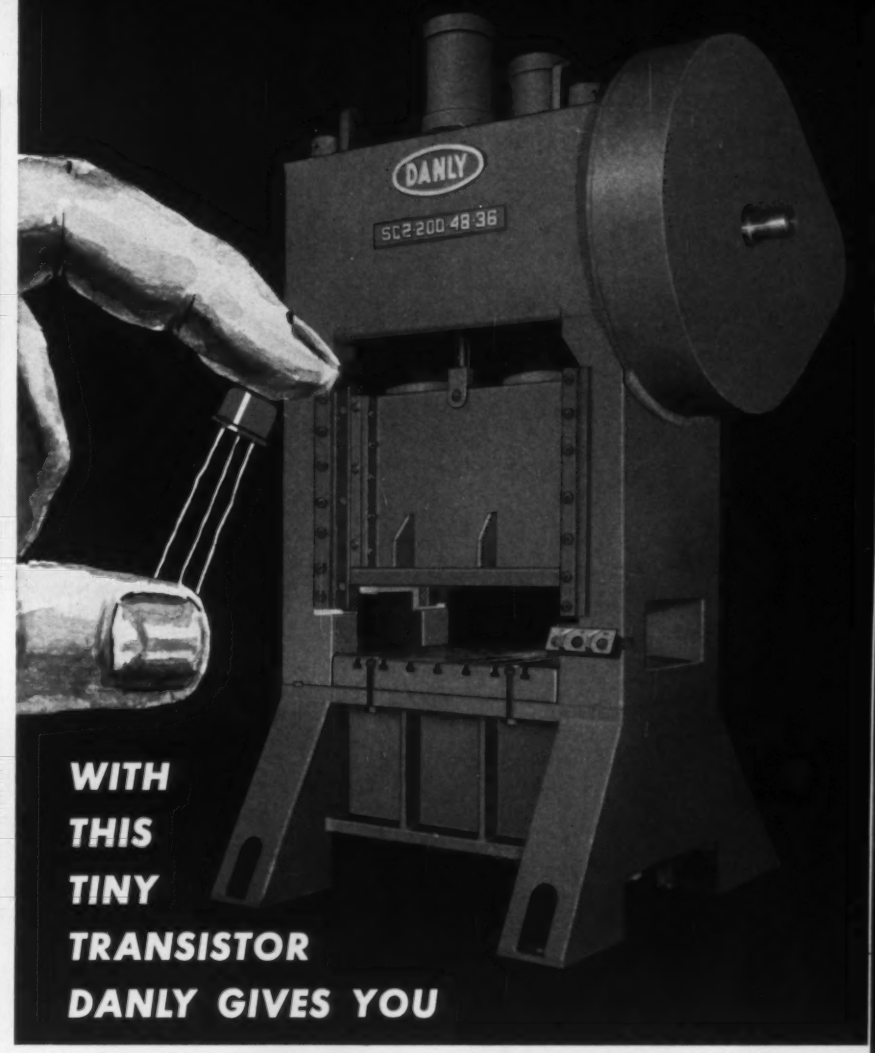
Seaporcel Metals, Inc.—**J. P. Wilhelm,** appointed asst. to the president.

Stauffer Metals Co. — **G. W. Bauer,** promoted to technical sales manager.

Hyster Co., Industrial Truck Div. —**D. W. Smith,** named Midwest regional representative.

Stromberg-Carlson's Commercial Products Div.—**O. J. Howe,** appointed manager, production control.

Philco Corp.—**E. G. Lagercrantz,** appointed asst. treasurer.



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2¾	x 2		x 2¼		x 3¾
	x 2¼		x 2½		x 4
3	x 2		x 2¾	4¾	x 2¼
	x 2¼		x 3		x 2½
	x 2½		x 3¼		x 2¾
3¼	x 2		x 3½		x 3
	x 2¼	4¼	x 2		x 3¼
	x 2½		x 2¼		x 3½
	x 2¾		x 2½		x 3¾
3½	x 2		x 2¾		x 4
	x 2¼		x 3		x 4¼
	x 2½		x 3¼	5	x 2½
	x 2¾		x 3½		x 2¾
	x 3		x 3¾		x 3
3¾	x 2	4½	x 2		x 3¼
	x 2¼		x 2¼		x 3½
	x 2½		x 2½		x 3¾
	x 2¾		x 2¾		x 4
	x 3		x 3		x 4¼
	x 3¼		x 3¼		x 4½

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FOUNDRY DIVISION
Dept. IA, Sheboygan, Wis.

For sheet stainless steel items, drawn or spun, consult our Contract Sales Division.

YOU ARBITRATE IT!

Five Week Bobble

■ When work picked up in a plant's electroplating department, the foreman prepared a list of men to be recalled. A clerical error left Jim H. off the list. And, he had more seniority than an employee who was on the list.

Five weeks later, the mistake was discovered. Jim was put to work at once. However, a loss of wages for Jim prompted the union to file a grievance demanding that he be reimbursed.

Who's to Blame?—Management admitted that it was at fault. But, it claimed that full back pay was not warranted because the union was also responsible in part. "The union should have been vigilant about this," said the personnel manager. "You are equal partners with us in administering this contract. If you had caught the mistake earlier, the damages would be slight. It's not fair to burden management with the full cost when both sides are at fault."

The union wouldn't hear of mitigating the damages. The matter finally went to an arbitrator under the rules of the American Arbitration Assn. How would you rule?

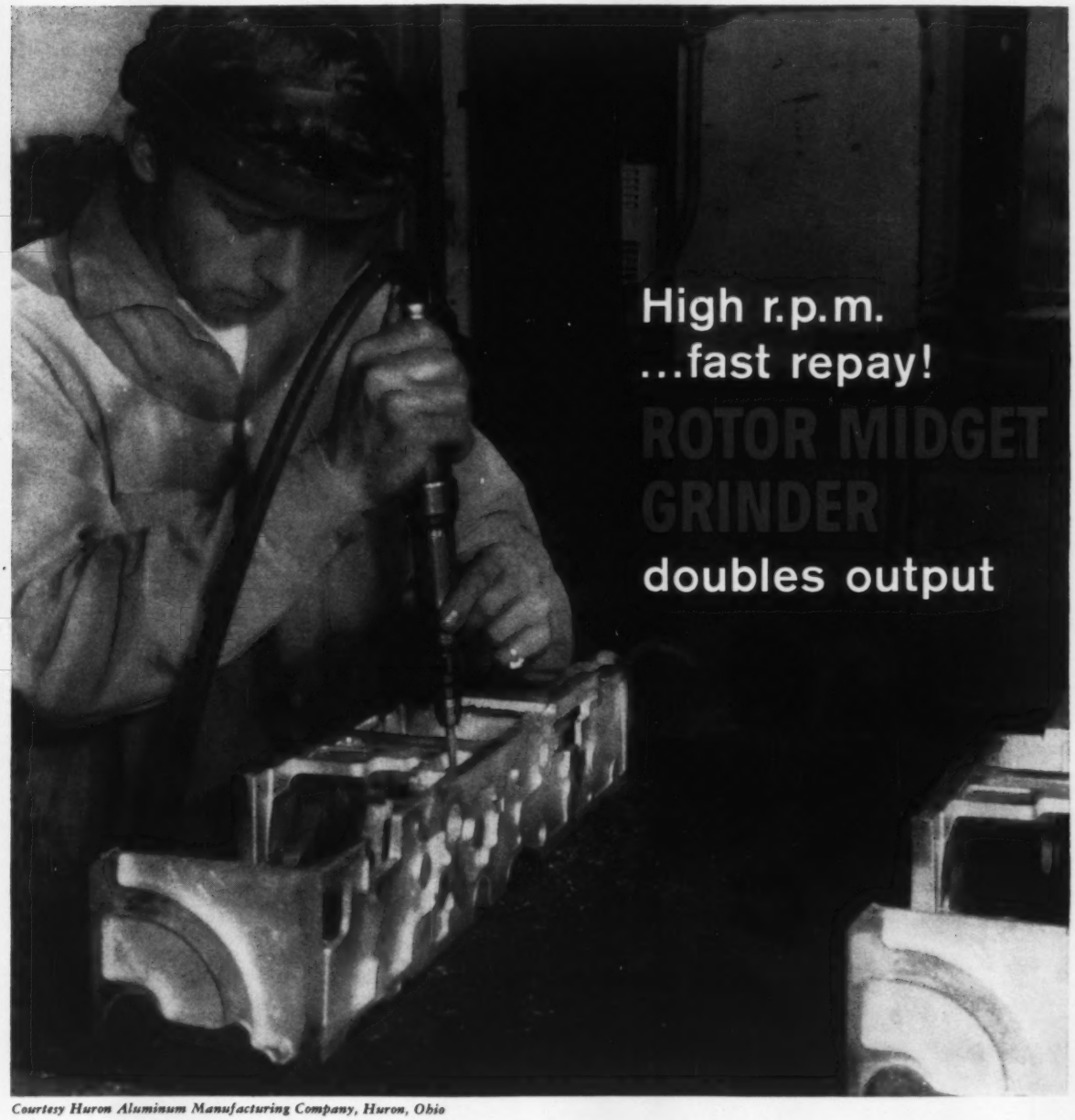
The Arbitrator Ruled:

The union's consent is not required before the company can take action on changes in the status of employees. The agreement left initiative in management's hand—an important advantage. Consequently, the responsibility of mistakes was entirely on the employer. The union didn't let the violation continue deliberately with the intention of running up a large back-pay bill. The company must pay Jim for the time he would have worked if the mistake had not been made.

From the files of
The American Arbitration Association

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the March 9 issue.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.



Courtesy Huron Aluminum Manufacturing Company, Huron, Ohio

JOB: Removing flash from aluminum castings. Formerly used universal electric tool. Time per casting averaged 10 minutes.

Switched to Rotor M1118 midget air grinder (30,000 rpm) with rotary file.

RESULTS: Time per casting cut to 5 minutes. Doubled production savings pay for new Rotor grinder in 4 weeks. Work is uniform. Light weight of tool reduces operator fatigue.

Ask for demonstration of this and other Rotor tools on your work to see how they can cut your costs.

Write for full-line Bulletin 53-C.

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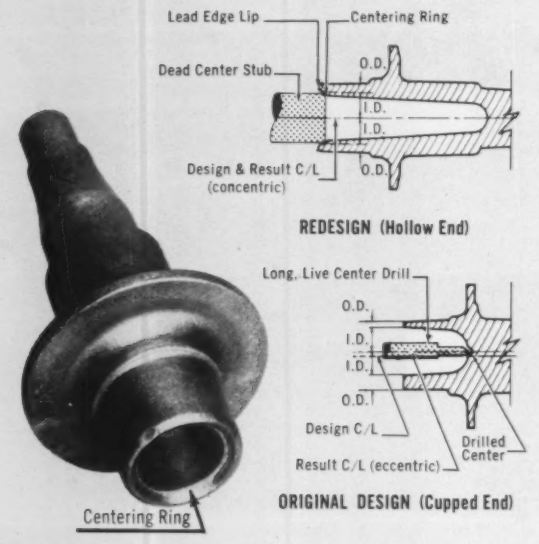
ROTOR AIR TOOLS: Assembly Tools • Drills • Small Wheel Grinders • Straight Grinders • Vertical Grinders • Scalers Chippers • Rammers • Special Tools • Air Motors • ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders • Polishers • Sanders

Superior Parts at Lowered Cost with This Fresh Approach to Forging

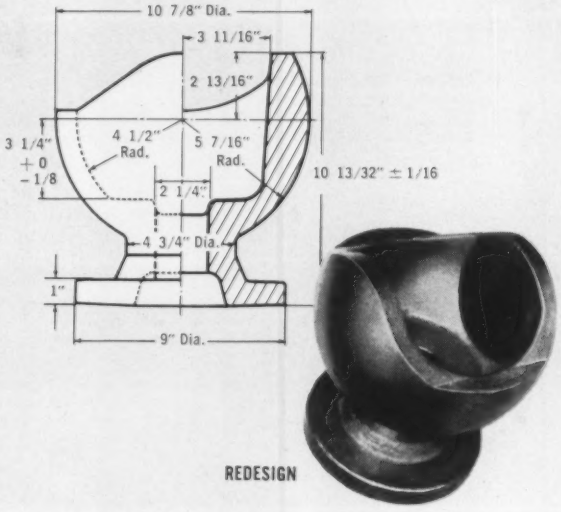
Many parts in use today are better as a result of design refinements suggested by COMMERCIAL's forging experts. Below are examples of COMMERCIAL upset forgings which demonstrate how these design refinements have resulted in superior parts for the OEM at lowered cost. These examples may appear to you as unusual in design—and this is the point...



Forging Redesign . . . Cuts Cost, Eliminates Tool Breakage, Cuts Scrap

Original design of axle spindle forging required chucking on the O. D. to enable center drilling of both ends. Part was held between drilled centers for overall machining. Concentric cupped axle end was center drilled blind with long, live center drill. O.D. and I.D. concentricity was difficult to maintain—causing eccentric drill centers. Result: tool breakage and machining scrap.

COMMERCIAL's redesign calls for a centering ring on inside edge of hollow end, forged without concentricity problem. Lead edge lip protects this important centering ring. The part can now be held for overall machining by a dead center stub engaged in the centering ring. Result: center drilling of open end not required, tool breakage eliminated, no machining rejects, metal savings.



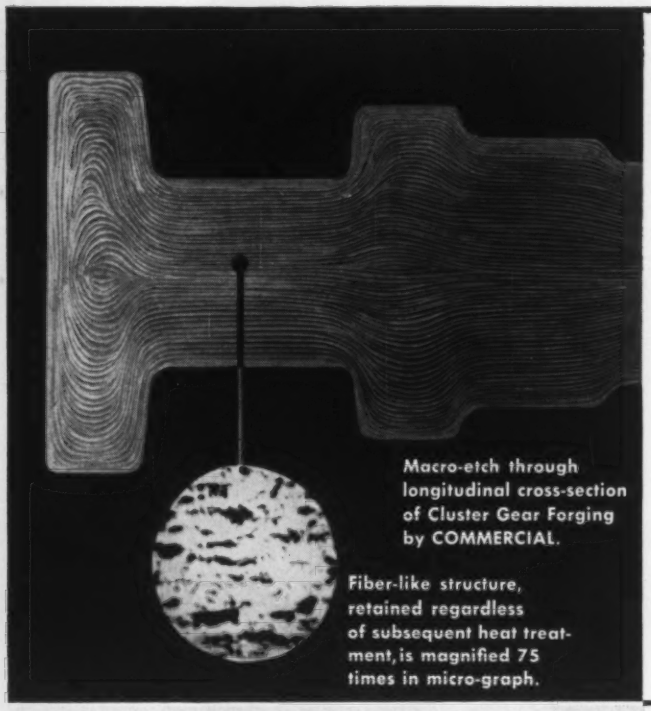
Unusual 80 lb. Forging . . . Reduces Cost, Replaces 95 lb. Casting

Ball joint housing for heavy duty steer and drive mechanism . . . formerly a steel casting. Field failures were traced to hidden metal faults. The housing was unable to withstand shock loadings encountered.

Problem: redesign for required strength—part to be no larger, no heavier, same shape.

Solution: an upset forging of unusual shape—flanged on one end, belled on the other, open at both ends. COMMERCIAL collaborated in the design and produced the part free of hidden metal flaws with sound, tough metal throughout—failures eliminated. Plus . . . weight saving over 15%, saving in machining cost 10%, greater strength-to-weight ratio.

When it's a vital part,



Macro-etch through longitudinal cross-section of Cluster Gear Forging by COMMERCIAL.

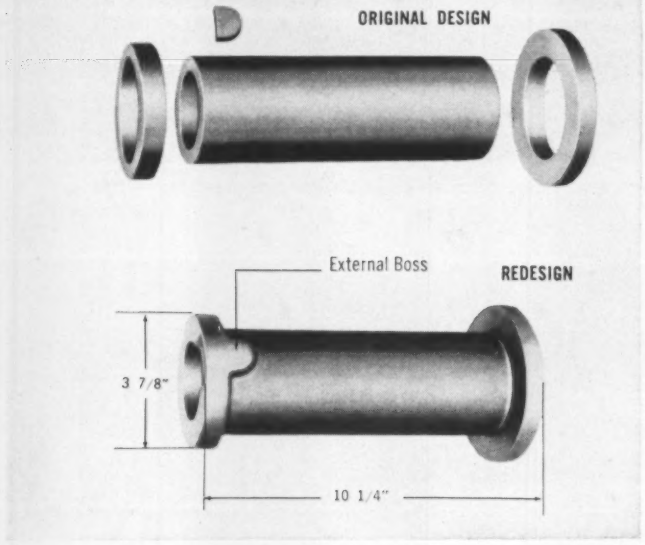
Fiber-like structure, retained regardless of subsequent heat treatment, is magnified 75 times in micro-graph.

Metal Quality Facts

Forgings start with "Forging Quality" rolled steel . . . steel that is closely controlled in its making for the purpose of eliminating defects and obtaining soundness—surface and interior. Such quality steels have been hot worked to obtain maximum development of their potential physical properties. Grain structure has been refined into a fibrous flow in the direction of working.

Mechanical hot forging of "Forging Quality" steel forces the metal in its plastic state to conform to specified shapes and achieves a vast improvement in its "as rolled" metal quality. Forging kneads the metal into a dense mass of strength and toughness and positions it into commercially exact dimensions and shape in all directions.

Upset Forging in closed dies produces by squeeze pressure a "looped" grain flow and permits concentration of grain density at points where the service stresses are calculated to be the greatest. Also, control of the directioning of the inherent fiber-like structure provides for maximum strength of the metal at required stress points. Not only are the properties of the metal improved in all directions but also the metal structure is refined and compressed resulting in a structural uniformity that renders the metal remarkably free from concealed defects.



One Piece Forging . . . Lowers Cost, Eliminates Four Piece Weldment

Blank for hydraulic cylinder outer barrel used to position Nike missile...originally a weldment—a tube, two flanges and a boss.

Problem: cut unit production time to meet crash program schedule, reduce assembly and machining cycle, increase strength-to-weight ratio.

Solution: a difficult upset forging because of external boss. COMMERCIAL tooled and produced the part in one piece to print. Assembly time eliminated, less distortion... improved machining conditions, forged to closer tolerances, uniform metal quality, added tensile and torsional strength due to controlled grain flow, strength-to-weight ratio increased, delivery schedule satisfied.

better make it FORGED

Advantages of Upset Forgings

- *Uniform strength, toughness and high fatigue resistance insure longer, more dependable service life for equipment.*
- *Parts made closer to finished dimensions—cuts scrap, reduces machining and finishing time.*
- *Components can be assembled by simple production methods into complex parts.*
- *Uniform response to heat treatment gives desired physical properties of precise degree.*
- *Higher strength-to-weight ratio obtainable—a vital factor in the design complexity of parts for the future.*

Features of Upset Forging by COMMERCIAL

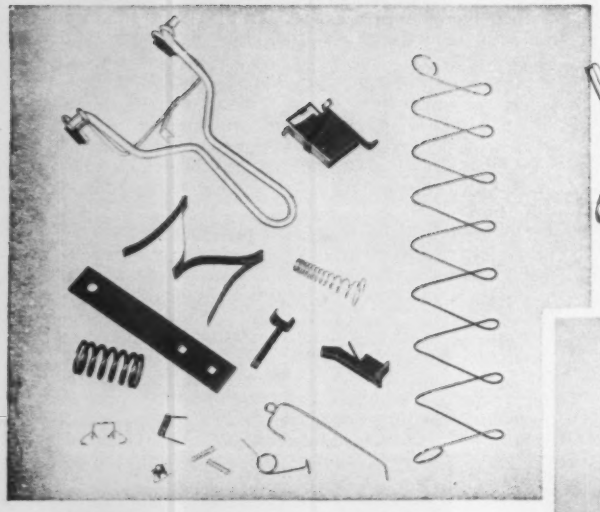
- *Batteries of upsetters from 1½" to 8"—custom or production runs.*
- *Hydra-Jet descaling prior to forging reduces imbedded surface scale.*
- *Magnetic particle depth inspection to detect metal faults before shipment.*
- *"Task Forging" team steeped with experience in producing the unusual upset forging.*

While designs are on the board, call on COMMERCIAL'S "Task Forging" team to collaborate with you—send print or sketch, sample or prototype. Address: Commercial Shearing & Stamping Co., Dept. K-6, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

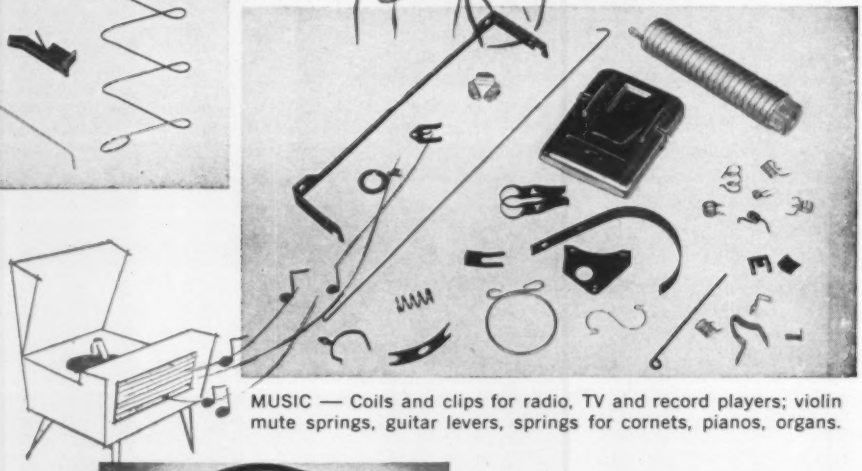
From Hunting to Hi-Fi . . .

There's a Spring in your Hobby

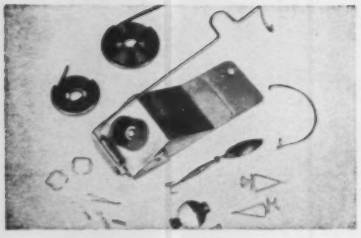


HUNTING — Ammunition clips, trigger springs and gun parts for civilian and military use; even a precision sling shot frame.

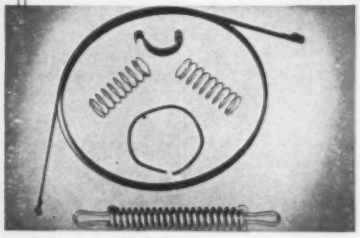
The booming market of hobbies and sports is typical of the far-reaching use of A.S.C. products. Often small but always important, springs make better products possible — and A.S.C. Divisions make better springs through constant research and experiment. Write for "The Picture Book of Springs."



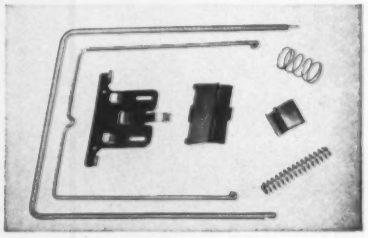
MUSIC — Coils and clips for radio, TV and record players; violin mute springs, guitar levers, springs for cornets, pianos, organs.



FISHING — power springs for reels; wire and flat springs for rod holders, lures; and a frog holder frame.



BOATING — starter springs and parts for outboard motors; shock-absorber spring for trailers; rope tightener spring.



PHOTOGRAPHY — view finder frames, shutter springs and stampings for movie and still cameras.

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General Offices: Bristol, Connecticut

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Milwaukee Division, Milwaukee, Wis.
Dunbar Brothers Division, Bristol, Conn.
Wallace Barnes Steel Division, Bristol, Conn.
Canadian Subsidiary: The Wallace Barnes Co., Ltd., Hamilton, Ontario and Montreal, Quebec

5012 © 1956 ASSOCIATED SPRING CORPORATION

Will it Replace Film?

With photography growing in importance for space and missile work, many new ideas are being tried to overcome limitations of standard processes. One gaining favor is electronic thermoplastic recording. Electronic sensors would yield immediate data that could be taped for computers. One use: To cut time lag in evaluating missile and rocket performance.

Does Radiation Help?

Efforts are underway to determine the effect of radiation bombardment on germanium crystals. This approach differs from chemical doping which the electronic industry has used to a great extent. Result could be lower cost production or, at least, a better understanding of transistor properties relative to method of production.

Joint Space Effort

Washington reaction to President Kennedy's invitation to the Soviet Union and other nations to join the U. S. in space programs is enthusiastic. The President, in his state of the union message, invited all nations to join in a weather-prediction program, a communications satellite program, and a program for probing Venus and Mars.

Molybdenum Rundown

The need for materials to withstand temperatures 2000°F and higher has led to growing attention for molybdenum and its alloys. Progress made in processing has removed the size limitations that formerly restricted their use. Ingots up to 12 in. diam are now being cast and processed into billets, bars, sheets, and tubes. A recent report from the Defense Metals Information Center gives a complete rundown of properties of molybdenum and its alloys.

Weld Gaps Escape Notice

Despite the success of both Polaris and Minuteman, the welding of big missile skins continues to present quality control problems. One Polaris contractor reports that weld gaps as long as 14 in. can escape nearly all types of nondestructive testing, and are revealed only by hydrostatic rupture tests. Missile-skin segments are so closely machined and fitted that failure of the weld to penetrate the joint is almost indetectable. An acid etch and 10x magnification are sometimes needed to expose the gaps.

Aircraft Sales Soar

Production of commercial aircraft in the U. S. for overseas shipment last year and this year is sharply reversing a downward trend started in 1956. In the first seven months of 1960, exports soared 89 pct over the previous year to $839.2 million. Ordered this year, 68 jet planes are alone worth $203 million.

Overhaul Space Plans

A general overhaul of U. S. space programs is in the offing. President Kennedy is expected to act on recommendations of his task force on space. One is to reorganize both military and civilian space agencies. Vice President Johnson plans a tune-up of space activities. Meanwhile, the Senate authorized its space committee to make a complete study of military and space programs.

Ease Tungsten Fabrication

Work on tungsten and its alloys that can be fabricated or shaped continues at Lewis Research Center. According to a report from T. Keith Glennan, outgoing head of NASA, it's been established that small additions of molybdenum improves the internal structure of tungsten and should make it easier to fabricate.

Trims Bomber Weight

Chemical milling is being used to pare the weight of stainless-steel honeycomb core for the new B-70 bomber. Additional parts of stainless, titanium, and other superalloys are also being made by this process. One reason for the increasing importance of chemical milling for the B-70 program is the widespread use for complex shapes with tolerances of 0.001 in.

Think Profit . . .

HOLO-KROME THERMO-FORGED* SOCKET SCREWS HELP INCREASE PROFITS BY REDUCING INSPECTION REJECT AND IN-WARRANTY SERVICE COSTS

Join other profit-conscious industrial leaders in taking a long, hard look at the profit-eating costs of inspection rejects and in-warranty service. You'll see why they're turning to *quality*—in materials and components—to reduce costs and increase profit.

Holo-Krome's exclusive THERMO-FORGED process produces socket screws of unmatched uniformity and quality . . . virtually free from flaws and hidden imperfections. Next time you order socket screws, think of *final* cost *first*. A few extra pennies spent on *quality* will save many hundreds of profit dollars by reducing the high cost of inferior fasteners.

Like full details on how Holo-Krome quality can help increase your profit? See your authorized Holo-Krome distributor, or write for more information.

*Trade Mark of The Holo-Krome Screw Corporation

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SOCKET SCREWS

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Gas Injection for Blast Furnace?

Blast-furnace operators find they can cut coke needs with gas injection.

Results, just compiled, show the technique has proved successful in full-scale production.

Here's the most recent report on this important development.

By **C. L. Kobrin,**
Metallurgical Editor

■ Gas injection, a new advance in pig iron production, is no longer experimental. It is now used in full blast furnace production.

Why the interest in gas injection? Blast furnace operators find that it cuts down on coke needs and increases iron production as much as 10 pct—a healthy boost when one considers the tonnage involved.

Takes the Lead—One of the pace setters is the Pittsburgh Coke & Chemical Co. A final report by E. R. Dean, assistant general superintendent, Coke and Iron Div., has just been completed. It gives the rundown on the company's use of gas injection for commercial production late last year.

The gist of the report: Coke-oven gas and natural gas can substitute for coke in the commercial production of pig iron and spiegeleisen.

To Follow Suit—"It won't be long," predicts C. T. Marshall, vice-president of the division, "until most of the blast furnaces in the country are enriching the air blast—whether it be with coke-oven gas, natural gas, oil, or even solid fuel."

Gas, oil or solid fuel? "Local

E. R. DEAN (l.): "Gas injection smooths out furnace operation . . . provides excellent silicon control."

Early Results Promise . . .

	Base Period	Gas Period	Change, pct
Daily Production, net ton	888	972	+9.5
Coke Rate, lb/net ton	1718	1506	−12.4
Gas Rate, cu ft/net ton	0	3175	—
Wind Flow, CFM	55,000	55,000	—
Gas Flow, CFM	0	2250	—
Gas pct/Blast	—	4.1	—
Blast Moisture, g/cu ft	10.4	9.8	−5.8
Blast Temp, °F	1351	1499	+11.0

. . . Success in Production Runs

	February-May	June-August	August-September
Type of Operation	Normal	Coke Oven Gas	Natural Gas
Number of Days	117	50	42
Production, net ton/day	845	779	748
Coke Rate, lb/ton	1705	1526	1501
Gas Rate, cu ft/ton	—	2430	2250
Wind Rate, CFM	51,083	47,143	46,308
Gas pct/Blast	—	2.60	2.42
Blast Moisture, g/cu ft	9.6	7.9	7.1
Blast Temperature, ° F	1395	1385	1498

economics will dictate the choice."

A number of factors must be considered: Geographic location of the plant in regard to coal; plant-furnace layout; the type of ore used.

Several Stress Gas—Most experimental work to date has been with gases. A number of steel producers are involved. Included are the U. S. Steel Corp., Bethlehem Steel Co., Colorado Fuel and Iron Corp., National Steel Corp., and the Lone Star Steel Co. Indications are that their findings are in the same ballpark as Pittsburgh Coke & Chemical's.

Work is also being done with the injection of fuel oil in blast furnaces. Esso Research and Engineering Co., N. Y., has developed a special injection system. Tests are still in progress.

Saves Coke—The first table lists results of two five-day test periods on Pittsburgh Coke & Chemical's blast furnace "B". The test period with coke-oven gas injection showed a 9.5 pct increase in iron production and a 12.4 pct decrease in coke consumption. In terms of gas usage, it works out to 67 lb of coke saved for every 1000 cu ft of coke gas used.

The second table gives production statistics for the summer of 1960. Mr. Dean emphasizes, however, that they were taken at a time when furnaces were not operating at full capacity due to business conditions. This explains the lower iron output. But it still can be noted that considerable coke has been saved.

Using natural gas instead of coke oven gas gave comparable coke savings.

"Other factors being equal, natural gas is the more desirable of the two gases," says Mr. Marshall. "It offers a number of built-in advantages."

J. S. MACKAY: "Both highly-beneficiated ores and low-quality ores benefit from gas injection."

"Even though coke-oven gas is a useful byproduct in most steel plants (it's used to fire steam systems before flaring off as waste gas) it must first be compressed before injection into the blast furnace. Natural gas is delivered to the plant already compressed.

"Also, unlike coke-oven gas, adds Mr. Dean, "natural gas is uniform in temperature and relatively free of impurities."

Locale Is Factor—Western steel producers will probably adopt natural gas most quickly. It's expected that Pittsburgh producers, located closer to sources of metallurgical coal, will favor the lower-cost coke-oven gas for some time.

Supply is another factor which may hinder use of natural gas. Today, eastern industrial users report that they can't get the amounts of natural gas they need.

How much gas is injected into the blast furnace? Studies show there's a point of diminishing returns. The limiting factor: Injection of gas decreases hot-metal temperature. Thus, blast temperature has to be raised.

Pittsburgh Coke & Chemical finds that a gas-to-blast ratio of 3-4 pct gives optimum results.

Is Coke Losing Favor?—Gas injection answers the historic cry of ironmakers for lower coke rates, says Mr. Marshall. Why lower coke rates? High initial investment for coke ovens, high maintenance costs, and decreasing market for by-products are some of the reasons.

Mr. Marshall estimates that more than 60 pct of all the coke ovens are at least 25 years old. An oven costs $200,000-$300,000. And nobody's anxious to build new capacity.

Now that the shift to gas or oil injection is imminent, forecast-coke needs are being revised downward. Pittsburgh Coke & Chemical Co., for example, estimates its long-range coke needs are down some 15 pct.

"It's doubtful," concludes C. T. Marshall, "that much new coke capacity will be built."

C. T. MARSHALL: "It's just a question of time until most blast furnaces switch to fuel injection."

Puts on Squeeze—The byproducts problem is a growing one for coke producers. Competition from petroleum byproducts is putting on the squeeze.

Dr. J. S. Mackay, director of research, Pittsburgh Chemical Co., makes this point. Eight years ago, 35 pct of the value of products from the coke ovens was from chemical byproducts. Today, it's only 15 pct.

Works With All Ores—One way to cut coke volume has been the use of highly beneficiated charge. However, coke volume can be cut only so far until the bosh gas becomes too weak to do an effective reducing job. Injecting gas strengthens the bosh gas and, thus, breaks the stalemate.

Even though the highly-beneficiated burden stands to gain from enriched fuels. the injection treatment plays no favorites.

Mr. E. R. Dean's report indicates that greatest improvements will be cited by users of low-quality ores.

In the past, these ores could not be effectively reduced by high-blast temperatures unless prohibitive amounts of steam were added. Gas substitutes for steam and permits high blast temperatures. Results: The unimproved Lake Superior ores will be given a closer scutiny as a candidate for blast furnace feed.

Smooths the Furnace—One of the major benefits of using gas injection has nothing to do with savings in coke or increased iron production.

The addition of gas smooths out furnace operation, reports Mr. Dean. "It provides excellent control over silicon—the plague of the merchant-iron producer."

Even without an improved cost picture, a merchant-iron producer feels he's ahead of the game when he gets better control over the furnace. It's a gain he'd be willing to pay for.

There's another important aspect, adds Mr. Marshall. "With a smoother working furnace, you cut down the air pollution problem of blast furnacing. There's less danger of 'hanging' or 'slipping' which throws excessive amounts of dust into the air."

See Some Changes—What's next in ironmaking techniques? "It's unlikely that there will be any major new technique for blast furnacing," answers Mr. Marshall. "Trends will continue along the same directions: There will be more beneficiation of the burden; pressures will be higher.

"In regard to size, it's doubtful if the furnace of the future will be any larger than it is now. In fact, it'll probably be shorter.

"If there's any major change in ironmaking," suggests Mr. Marshall, it'll be the coke oven. Economically, the coke oven is the weakest link in the process."

Maybe New Equipment—"It's possible that coke-making structures of the future will play a less important role in the overall picture. Coke will be produced in other than the coke-oven in wide use today. The new coking oven may even be a continuous-retort type."

Reprints of this article are available as long as the supply lasts. Write Reader Service, The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Ask for Reprint **No. 145.**

Ductile Vanadium: Techniques That Make Fabrication Easier

By **T. W. Merrill**—Director of Product Research, Vanadium Corp. of America, New York

As vanadium becomes more popular, it's only natural that new techniques will be developed to work this relatively new metal.

Can it be fabricated easily? Here are a few answers.

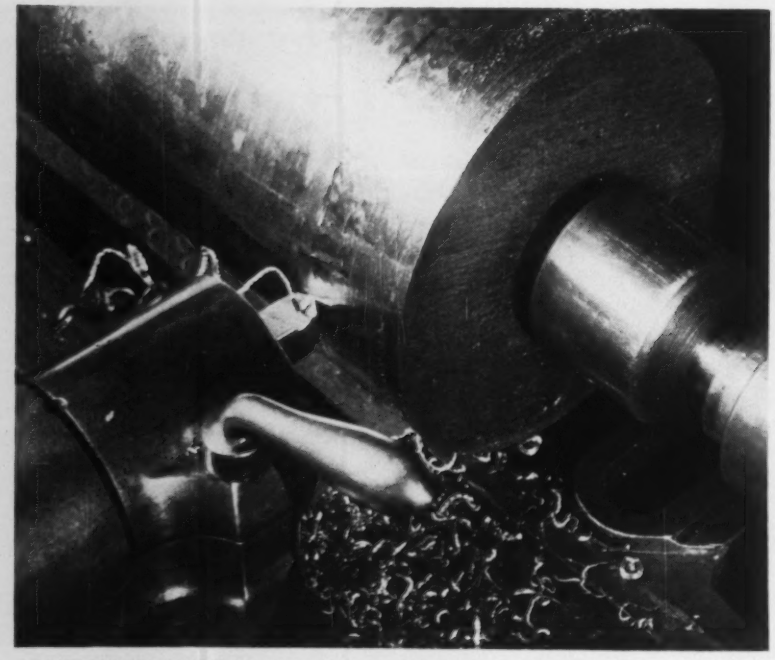
■ A few years ago, ductile vanadium cost several hundred dollars a pound. Now the per-pound price stands at well under $50. Along with this big drop in cost is a metal which is not only purer but of higher quality as well.

Vanadium maintains good strength at high temperatures. It also does a fine job in the field of corrosion resistance. For example, vanadium has recently found favor in nuclear reactors as a cladding material for fuel elements. The reasons are two-fold: It will not alloy with uranium and it has good thermal conductivity.

It would be hard to find another metal whose resistance to hydrochloric and sulphuric acids is quite as good as vanadium. It also withstands the effects of aerated salt water very well.

Vanadium, of course, has found its main use as an aloying element in steel. It is also an alloying element for cast iron, titanium and aluminum alloys.

Easy to Fabricate—The properties are excellent. But how easily can it be worked? Can it be machined or welded?



MACHINABILITY: First step in machining vanadium ingot is a 0.020-in. cut to remove the contaminated surface. Cut is made at 78 sfpm.

Vanadium of reasonable purity is ductile and can be hot-worked easily. However, the metal must be protected during heating; otherwise it will tend to oxidize rapidly. The starting temperature depends upon two factors. These include the length of the hot-working operation and the desired finishing temperature.

Reheating should be avoided. Heating can begin as high as 2300°F. Finishing temperatures are limited both by the stiffening of the metal as it cools and by the high crystallization temperature.

Use Inert Gas—Much effort has been made to lick the contamination problem during heating. One practical solution is to heat the metal in chambers filled with inert gas. Most shops can do this. Lack of gas-tight closures on such chambers may not give 100 pct protection, but with short heating times the method can be used.

Vanadium ingots, 6 in. and under in size, can be hot-worked quickly if the surfaces aren't overly contaminated during heating. Since this is an unknown factor, it's best to follow procedures common to alloy steels.

Hot-rolled sections of vanadium can be straightened within the 700°-800°F range. If this step is attempted after the bars are cold, cracking can occur. Reheating to the above range for straightening has been successful.

Cold Working—Vanadium can be cold-worked without excessive hardening. To do it, the surfaces on the piece to be rolled must be free of contamination. This condition can be met by machining all hot-worked surfaces, removing 0.020-

How Cold Working Affects Strength

Material and condition	Tensile strength, psi	Yield strength, psi	Elongation, pct in 2 in.	Rockwell hardness
Hot-rolled bar	68,400	63,700	27.0	B 85
Vacuum-annealed wire	78,000	67,100	25.0	A 48
Cold-drawn wire, 80 pct	132,100	111,000	6.8	A 54
Vacuum-annealed sheet	77,800	65,900	20.0	B 83
Cold-rolled sheet, 84 pct	120,100	112,600	2.0	B 100

0.040 in. from each surface.

Precaution should be taken, however, in instances where the hardness of the contaminated surface of hot-worked bars is extreme (as high as Rc 60).

Hot-rolled slabs that are ¾ in. thick by 6 in. wide can be cold worked into thin strip. You can bring this thickness down to 0.010 in. without annealing. Some bars, however, appear to harden and begin to crack at intermediate sizes. Here, annealing is required.

It's believed that contamination from oxygen and nitrogen reduces the ability of vanadium to be cold-worked.

Annealing Range—Vacuum annealing of cold-rolled vanadium has been done at 1650°F. Only a short time is needed; five to ten minutes at temperature is enough. Presumably, annealing in a completely inert atmosphere would be satisfactory. Reductions up to 75 pct with no annealing are the rule. Reductions of more than 99 pct aren't unusual.

Wire drawing has also been carried out successfully. A rod size of ⅜ in. diam is suitable. Copper plating of the rod will aid the operation. Carbide drawing dies for the larger sizes and diamond dies for the smaller sizes have been used.

Common practice has been to reduce the wire in small steps (about 10 pct per pass). Industry has drawn wire down to 0.010 in. diam.

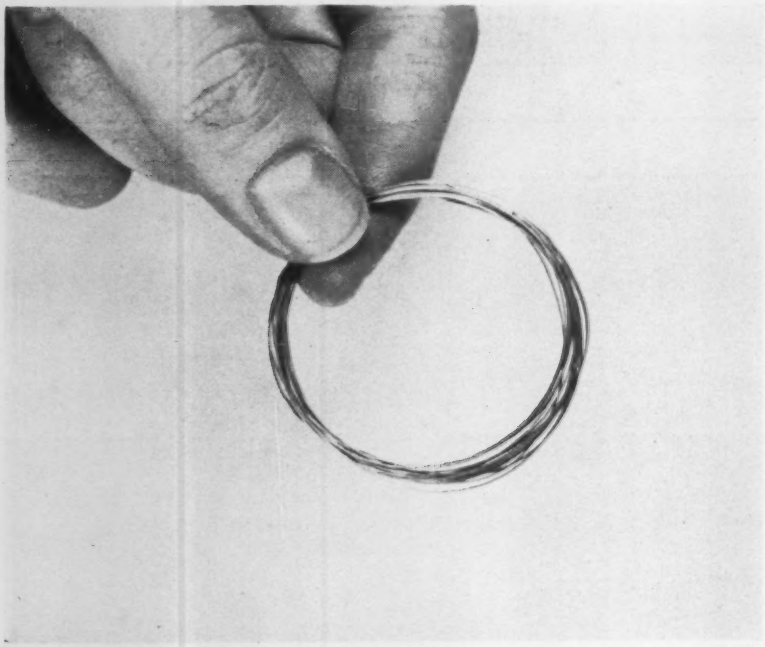
Easy Method—Vanadium can be extruded quite easily below 1000°F. Tube blanks (2 in. OD x ¼ in. wall) have been extruded from hot-rolled

ALL VANADIUM: Hot rolling was used to create this bar of vanadium. It's 98-in. long, ¾ in. thick and 6 in. wide.

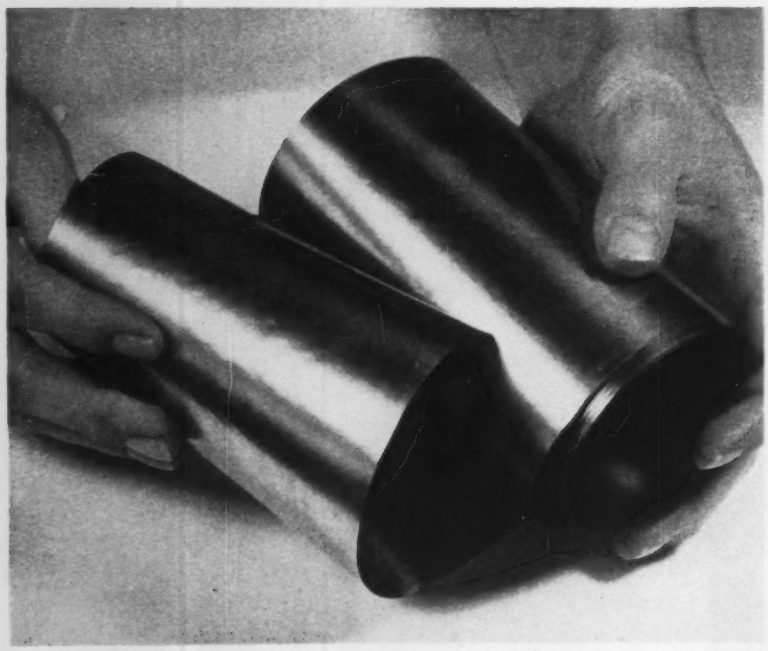
and turned bars as well as from ingots.

Fabrication becomes much easier if you extrude from ingots. You avoid the troublesome heating steps and the conditioning of the hot-worked product.

If you can do it, it's best to omit the hot-working step altogether. This can best be done by warm extruding the ingots and cold-drawing or cold-rolling the product.



COLD DRAWING: Wire of vanadium can be cold drawn to 0.010 in. diam. The accepted practice is to reduce the wire in small steps.



ULTRATHIN FOIL: Vanadium can be reduced to thin foil thicknesses with little effort. Specimen is only 0.002 in. thick and 4 in. wide.

How About Machining?—Once you remove vanadium's contaminated surface, the metal will machine in much the same manner as the more difficult stainless steels. The big problem is the galling of the tool.

In general, maintain low speeds with light to moderate feeds. If the desired finishing cuts are very light, higher speeds can be used. Once you start using multi-toothed tools, such as saws and milling cutters, you'll need a good deal of power. To avoid breakdowns, maintain slow speeds along with light feeds.

How do you handle the hard surface on hot-worked products? Take deep machine cuts using very slow speeds. Vanadium can be ground, too, as long as the metal is not allowed to overheat.

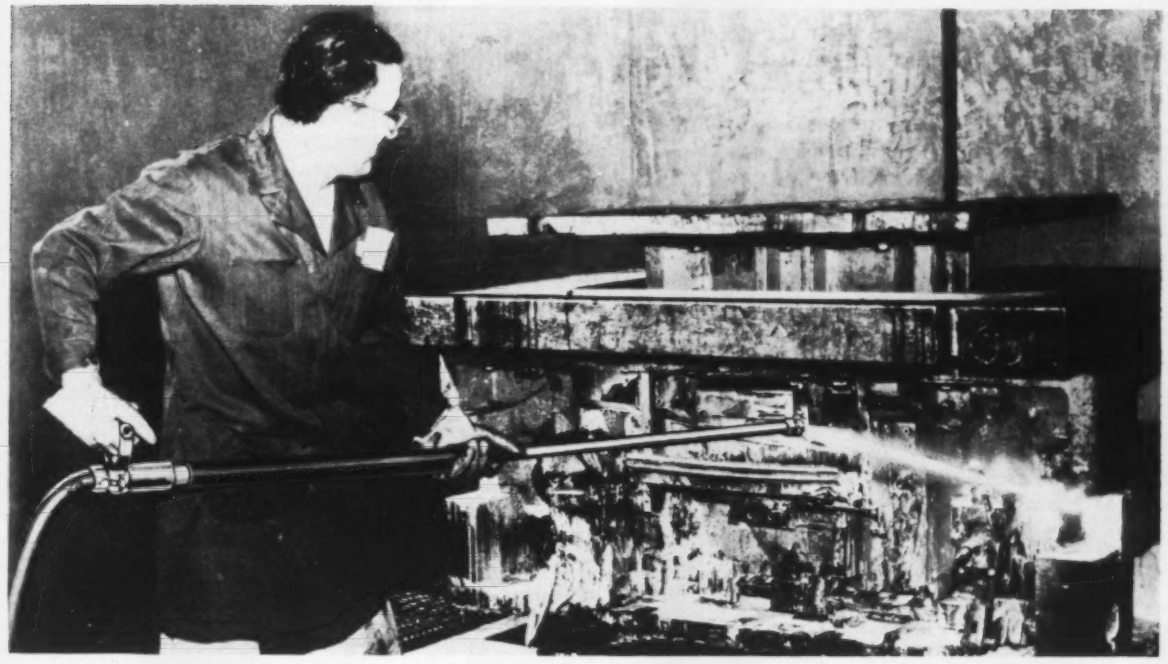
Inert Gas Again—Avoid contamination of the molten metal and the heat-affected zones, and the welding of vanadium is easy. The more contamination you prevent, the more ductile the weld.

The small, short weld can be handled by inert-gas-shielded metal arcwelding. A larger, more continuous weld should not be attempted unless added jets of inert gas are used. Welding in a gas-flushed container is another possibility.

Soft and Ductile—In its pure form, vanadium is soft and ductile. Its strength is sensitive to interstitial impurities, varying from 30,000 psi in its purest form to 80,000 psi in its commercial form.

There are various types of vanadium ore. However, carnotite seems to have the greatest commercial value. It contains 1 pct vanadium and about ½ pct uranium. There is a good supply of carnotite which is expected to remain plentiful for some time to come.

As the demand for vanadium increases, more efficient and less costly methods will be devised to fabricate the metal into any desired shape or size. At the same time, the price will go down even further.



FASTER CLEANING: In only a matter of minutes, the stamping die is cleaned of all slugs and drawing compound. The cleaner mixes water with steam and detergent under high pressure to form the jet stream.

Jet Stream Cuts Die Downtime

New Unit Removes Slugs, Lowers Reject Rate

Accumulated drawing compound and slugs often cause distorted stampings. Die downtime means money lost.

Here's a new device that cleans quickly and thoroughly.

■ Powerful hydraulic jet cleaning units simplify die cleaning at the Ford Motor Co.'s Dearborn stamping plant. These cleaners mix water with steam and detergent under high pressure, to form a powerful hot-jet discharge stream.

The impact of the stream quickly and thoroughly removes accumulated drawing compound from the dies.

Formerly, the conflux of drawing compound distorted stamped parts and caused slugs to adhere. Cleaning time was considerable since 5,000 dies and 1,000 presses were cleaned by hand with putty knives and brushes. With the hydraulic unit, workers clean faster and easier. This boosts both morale and efficiency.

Cold or Hot—The hydraulic jet cleaners, made by Sellers Injector Corp., Philadelphia, are located at stations with piped connections for cold water and steam. The units' unique venturi-injector design boosts discharge pressure to almost 2⅓ times the inlet steam pressure.

The higher discharge pressure not only provides the needed impact for the hydraulic scrubbing action, but also results in a 120-mph stream velocity. This sends a solid jet stream as far as 30 ft away from the nozzle.

Heat Also Helps—Cleaning effectiveness is also increased by the high temperature of the jet stream (about 190°F) and by the addition of detergent. This compound is drawn from a storage drum, in preset amounts, through the siphoning action of the cleaning unit. Since there are no moving parts, maintenance is low.

The units are supplied with 50 ft of ¾-in. neoprene hose, cleaning lance with handle, and nozzle. The nozzle has two all-purpose interchangeable discs.

Special nozzles are made to suit individual requirements. Stationary or portable versions, mounted on 50-gal detergent tanks, can also be had. With the portable unit, it is possible to clean the die without removing it from the press.

Reversing of Heat-Treat Cycle Trims Machining Costs

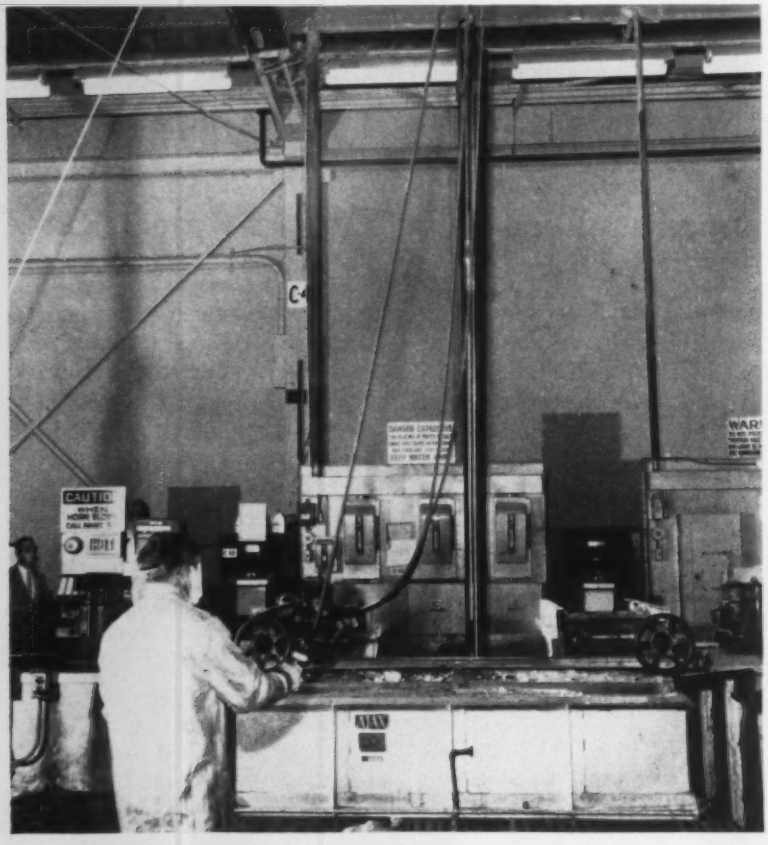
By **W. J. Lavigne**—Production Metallurgist, Watervliet Arsenal, Watervliet, N. Y.

Machining first and heat treating later enables an arsenal to work with a material at 240 Bhn rather than 350-429 Bhn.

An immersion heat treatment reduces distortion while maintaining the as-machined surfaces in their original conditions.

▪ What can be done when machining costs are pricing you out of business? Consider the maker of artillery parts. Like so many other manufacturers, arsenals are being asked to produce hardware from higher-strength materials.

These requests are being met—at a price. But, these materials are more difficult to machine. Another complicating factor is the need for section sizes as thin as 0.1 in. Manufacture is becoming so difficult that grinding is being considered as the main machining process for these superstrength metals.



HEAT TREAT MACHINED PART: A gun tube, machined in annealed state, enters a 16-ft deep salt bath for heat treatment to desired properties. Despite muzzle down position, no bending or distortion of tube occurred.

What's the Answer?—What can be done to reduce the cost spiral? One way is to eliminate the cause of it.

Past and present practice is to first heat treat rough forgings and castings. Next these items are machined in the hardened state. Why not machine in an annealed condition and heat treat as a final operation?

Obviously, this solution isn't as easy as it sounds. Heat treating as a final operation rather than a premachining operation presents problems. For example, warpage or distortion cannot be tolerated; machined surfaces must be protected from damage through fire scale, oxidation and decarburization.

Project is Born—From these requirements, the immersion-heat-treating project was spawned. Its aim is to furnish a more economical method of manufacturing components in the present yield-strength range of 160,000-190,000 psi.

A second goal is to provide a proven process. The purpose: to economically produce all machined and fabricated parts to yield strength levels of 300,000-325,000 psi now being experimentally attained and planned for future weapons.

Name is All-Inclusive — Even though the immersion-heat-treatment process now involves a molten salt bath, this name was specifically chosen so that other mediums could be used.

There are many advantages to a salt-bath treatment. It maintains temperature accurately and automatically. It also reduces distortion in two ways: the weight of the molten salts supports the items be-

ing treated; and the salt bath has a uniform temperature distribution.

Salt baths reduce distortion in yet another way—by automatic preheating of the work. When a cold part is placed in the bath, it's immediately enclosed in an envelope or cocoon of frozen salt. This envelope usually melts away in about a minute. By then, the work has been safely preheated.

No air can contact the fully immersed part. As a result, sealing, oxidation and decarburization are minimized. Moreover, when the work is removed from the bath, a thin film of salt protects it continually.

Try Difficult Test Pieces—The initial approach was made using a breech block. It's geometric configuration made it one of the most severe test pieces.

Preliminary tests on same 75 mm breech blocks, rejected because of soft cam paths, were encouraging. To check these results, four 90 mm-M41 breech blocks were finished-machined in the annealed state. Hardness was of 240 Bhn.

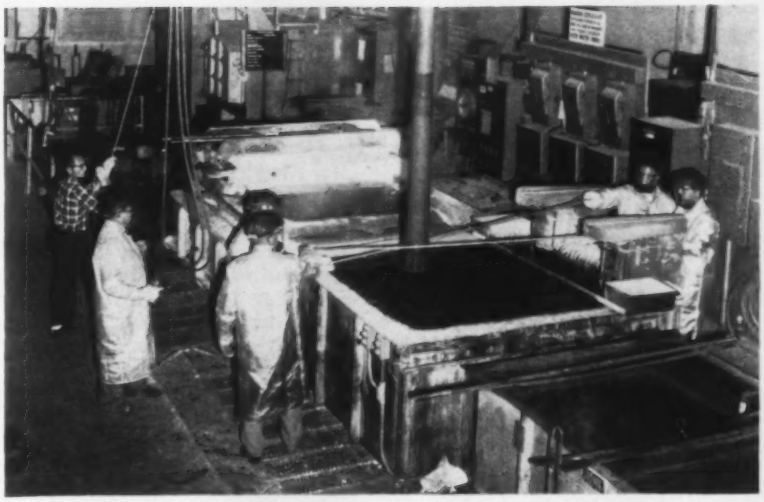
These four blocks, because they were processed as production items, were subjected to the normal inspection procedures of the standard gages. An inspection report was prepared for each one.

Lowers Machining Costs—After heat treatment and reinspection, an average of only three dimensions per block would not accept the gages. These deficiencies were corrected by minor hand benching with crocus cloth. No remachining was required.

Estimated savings in machining time were 30 pct. Lower tool upkeep costs, reduced power and maintenance facilities and an overall increase in output also contributed to lower machining costs.

Next, a Gun Tube—For all intents and purposes, the breech block phase was successfully completed. Next, heat treatment was tried as a final operation for a gun tube.

Rohr Aircraft Co., Chula Vista, Calif. was a logical choice to do



READY FOR QUENCHING: Tube, held by welded loop in standard muzzle-up position, is to be quenched after salt-bath treatment. For completion, the hardened tube will require only minor facing and sinking steps.

Heat-Treat Time Tumbles

CASTING I

Old Method

1. Heat to 1750°F in 8 hours
2. Air cool
3. Reheat to 1225°F in 12 hours
4. Raise to 1600°F in 5 hours
5. Lower to 1500°F in 2 hours
6. Water quench
7. Heat to 600°F in 3 hours
8. Raise to 1060°F in 5 hours
9. Water cool
10. Heat to 600°F in 12 hours

Furnace Time, hours	47
Yield Strength, psi	171,500
Red. of Area, pct	34.4
Charpy Impact Values	8.0
	14.0
Breech Position	DOWN

New Method

1. Preheat to 600°F for 6 hours
2. Austenitize 1 hour at 1575°F
3. Austemper 1 hour at 650°F
4. Temper at 800°F for 2 hours
5. Double temper 6 hours at 800°F

Furnace Time, hours	16
Yield Strength, psi	192,050
Red. of Area, pct	24.1
Charpy Impact Values	10.0
	9.0
Breech Position	UP

FORGING I

Old Method

1. Heat to 1750°F in 8 hours—hold 4 hours
2. Remove and cool in still air to 500°F
3. Heat to 1580°F in 4 hours—hold 4 hours
4. Drop to 1520°F in 1 hour—hold 1½ hours
5. Quench in water
6. Charge in furnace at 300°-400°F—hold 6 hours
7. Heat to 1030°-1050°F in 3 hours—hold 14 hours
8. Cool in water 30 minutes

Furnace Time, hours	45½
Yield Strength, psi	169,500
Red. of Area, pct	25.1
Charpy Impact Values	13.5
	13.5
Breech Position	DOWN

New Method

1. Preheat to 600°F for 6 hours
2. Austenitize at 1575°F for 1 hour
3. Interrupted quench at 500°F, salt bath, 7½ minutes
4. Temper at 800°F for 2 hours
5. Double temper at 800°F for 6 hours

Furnace Time, hours	15
Yield Strength, psi	205,100
Red. of Area, pct	22.3
Charpy Impact Values	9
	9.5
Breech Position	DOWN

Yield Strengths Are Improved

CASTING II— Heat Treat Cycle

Old Method

1. Heat to 1750°F in 10 hours—hold 12 hours
2. Air cool for 8 hours
3. Reheat to 1625°F in 10 hours—hold 12 hours
4. Water quench
5. Charge in furnace at 500°F
6. Raise to 1090°F in 10 hours—hold 20 hours
7. Water cool

Furnace Time, hours	74
Yield Strength, psi	166,250
Red. of Area, pct	39.5
Charpy Impact Values	18
	19
Breech Position	DOWN

New Method

1. Preheat to 600°F for 6 hours
2. Austenitize at 1575°F for 1 hour
3. Austemper at 650°F for 1 hour
4. Temper at 800°F for 2 hours
5. Double temper at 800°F for 6 hours

Furnace Time, hours	16
Yield Strength, psi	150,150
Red. of Area, pct	40.2
Charpy Impact Values	12
	9
Breech Position	UP

FORGING II— Heat Treat Cycle

Old Method

1. Heat to 1750°F in 8 hours
2. Air cool
3. Heat to 1225°F in 12 hours
4. Raise to 1600°F in 5 hours
5. Lower to 1500°F in 2 hours
6. Water quench
7. Heat to 600°F in 3 hours
8. Raise to 1060°F in 5½ hours
9. Water cool
10. Heat to 600°F in 12 hours

Furnace Time, hours	47½
Yield Strength, psi	158,750
Red. of Area, pct	42.0
Charpy Impact Values	14.8
	18.8
Breech Position	DOWN

New Method

1. Preheat to 600°F for 6 hours
2. Austenitize at 1575°F for 1 hour
3. Interrupted quench — 500°F salt bath for 7½ minutes
4. Temper at 800°F for 2 hours
5. Double temper at 800°F for 6 hours

Furnace Time, hours	15
Yield Strength, psi	137,150
Red. of Area, pct	35.5
Charpy Impact Values	11
	11
Breech Position	DOWN

the heat treating. It has what is claimed to be the deepest salt bath (16 ft deep) in the country. The company agreed to treat a quantity of tubes to further the experiment.

Four 75 mm, M35 excess tubes were vacuum annealed and straightened. They were then stress relieved and ground to a uniform wall thickness.

Sets Hand Task — Rohr was asked to heat treat with as little warpage as possible. Yet, the as-machined surfaces were to be kept in an acceptable condition.

One group, consisting of a forging and casting, was to be treated to a yield strength above the 190,000 psi maximum requirement. Another group, similar to the first, was to be treated to values less than the minimum yield strength requirement of 160,000 psi.

Another step was taken to further impose the worst possible condition in heat treating. Two tubes, one from each group, were suspended by the breech ends rather than by the muzzles. This position is opposite from the standard procedure.

Why This Position?—The reason for usually suspending a gun tube in the breech down position is to get the greatest weight into the furnace first to reduce distortion.

The tables give a comparison between previous heat treating conditions, and the experimental procedure for heat treating after machining. Properties obtained from these two methods are also given.

This comparison, although based on preliminary results, shows a reduction in the final heat treating phase of at least two-thirds of total furnace time. From an economy standpoint, these savings plus those in machining are sizeable.

Offers Advantages—The process has two other advantages. First, immersion heat treatment gives increased yield strengths to standard gun steels. This suggests a possible reduction or substitution of vital alloying elements.

Second, further process development may allow a reduction in wall thickness. Result: the weight of the five is reduced.

Warpage or distortion is held to a minimum. Tubes contain no more bend than before treatment. Some tubes appeared to be straighter.

The results are even more startling when one considers that about 20 pct of present tube forgings receive more than one heat treatment before acceptance to the physical property requirements. It was actually necessary to deliberately subject the two low tubes to inadequate quenches to make them rejectable.

No Heat Checking — Life expectancy of the tubes, produced by this method, might be extended. Why? When machining hardened tubes, the tool point tends to tear, leaving minute voids in the bore. The edges of these tears cause a turbulence in the gas stream. Result: heat checking or progressive fatigue.

Conceivably, this process might convert Watervliet Arsenal to a single-alloy arsenal. It would allow the purchase of solid forgings. Trepanning of these forgings would give a bore close to the required finish.

The slug obtained from trepanning could be used as bar stock for other processes. Nothing would be wasted but the outside turning chips and the rifling scrap. This would give further savings because the cost of the forging is based on solid weight plus machining costs.

Chipbreaker Extends Tool Life

Oscillating Tool Action Reduces Heat and Wear

Chipbreakers are well known as a tool-saving necessity.

But by adding motion to the tool an even greater bonus can be had.

▪ A new machining device fragmentizes chips to a desired size. At the same time, it lengthens cutting-tool life. The device, called the Cleveland Chipbreaker and Tool Booster, can be used on grooving, plunging, forming and cutoff jobs.

Cleveland Hobbing & Machine Co. designed the unit for use on lathes, automatics, planers, shapers, or wherever multiple or single-point tools are used for cutting metal.

Controlled Action—The unit operates with a controlled, high-frequency, hydraulically-powered, oscillating action. This action maneuvers the tool's cutting edge against the cut and backs it away for cooling many times per second. The frequency of this motion can be regulated from 25 to 200 cycles per second by simply turning a dial on the chipbreaker.

This high-frequency side motion, into and away from the cut, produces a cleaving action which fragmentizes chips to the desired size. This side motion also reduces heat and wear of the tool bit. The chipbreakers work well on any kind of metal from soft, stringy, materials such as copper and aluminum to various types of steels, including stainless, and exotic metals.

The cleaving action imparted to the tool bit, in addition to fragmentizing chips, reduces the horsepower needs for a given cut by as much as 50-pct below the normal needs of a fixed tool holder.

Increases Proportionally—Horsepower delivered by a machine (neglecting rotational and frictional losses in the machine) is applied directly to the tool-cutting edge.

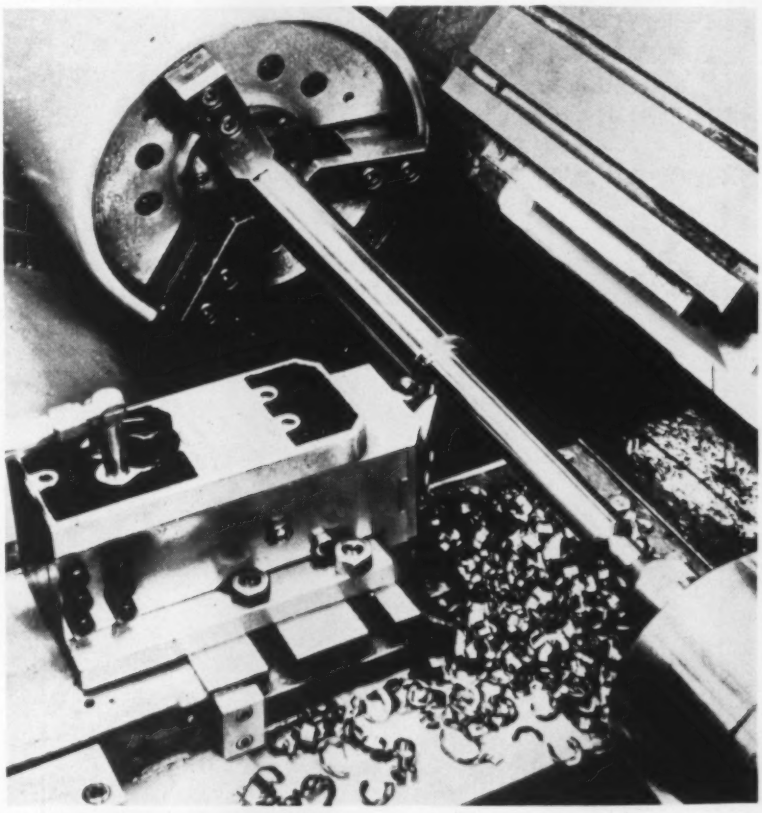
Tool life can be raised in direct proportion to the reduction in horsepower to which the cutting edge is subjected. Thus, the chipbreaker is an important factor in giving the tool longer life.

The controlled high-frequency loading and unloading of the tool bit also means that feeds and speeds can be raised to increase production. As the oscillating action shears off chips, it tends to wipe off continuous feed marks on its back stroke.

Size control is more precise since the tool does not have to be advanced as often to compensate for wear. Deflection in the work is also reduced because much less tool pressure is required for a given cut. For this reason, heavier cuts can be taken with light machines.

Cuts Clearance—The chipbreaker performs well on grooving, form, or plunge cuts with either single-point of multi-point tooling. The side motion given to the tool allows it to cut its own side clearance so that bind, chatter and burning are eliminated.

The chipbreakers are usable with various types of coolants and can be used with all kinds of tool bits such as high-speed and carbide. Any type of tool holder can be used.



COOL TOOL: The hydraulically-powered chip breaker maneuvers the tool cutting edge against the cut and backs it away many times per second.

New Methods Pace Tool Design

Are Some of Your Machining Methods Obsolete?

By **Horace Frommelt**—Director, Mfg. Research Center, Ferro Powdered Metals Inc., Salem, Ind.

In even the most modern machine shops, outdated methods can create production snags.

No matter how good a new machine may be, it's only effective when it's used properly.

■ Methods like machines are subject to obsolescence. In fact, methods often become outmoded faster than machine tools. Yesterday's good practice may prove painfully uneconomical today. New materials, cutting tools, machines, techniques or even new twists in tool geometry can make the difference between good and bad practice.

Generally speaking, stainless steels and other work-hardening metals should be machined with positive angles—even strong positive angles. Until recently, most shops stumbled through these tough alloys. They used indexable precision-ground carbide bits.

Positive Angles—Today, triangular precision-ground carbide blanks can be assembled in negative-welled shanks or tool holders. This insures ground-in positive angles. Thus, all six sides of a triangular bit serve full duty in removing metal.

Typical geometry of these tool bits appears in an illustration. Use of a 7° blade angle, with the 5° negative seat, gives a 2° positive angle.

The day of roughing and finishing cuts is passing. When the proper equipment is available, it's no longer worthwhile to process a job with two passes. In fact, it's now considered bad practice because of the waste involved.

Heavy cuts, taken with ceramic cutting tools yield good finishes. These finishes are better than those obtained with so-called "finishing" cuts. The reason hinges on 50-hp bites. These bités leave a better than commercial finish.

Single Pass—Miracle oxides in the tool bits preclude roughing and finishing passes. Basically this same development makes follow - up grinding obsolete, in many instances. Savings can be truly remarkable. To turn in one machine, then transfer to another for grinding proves costly.

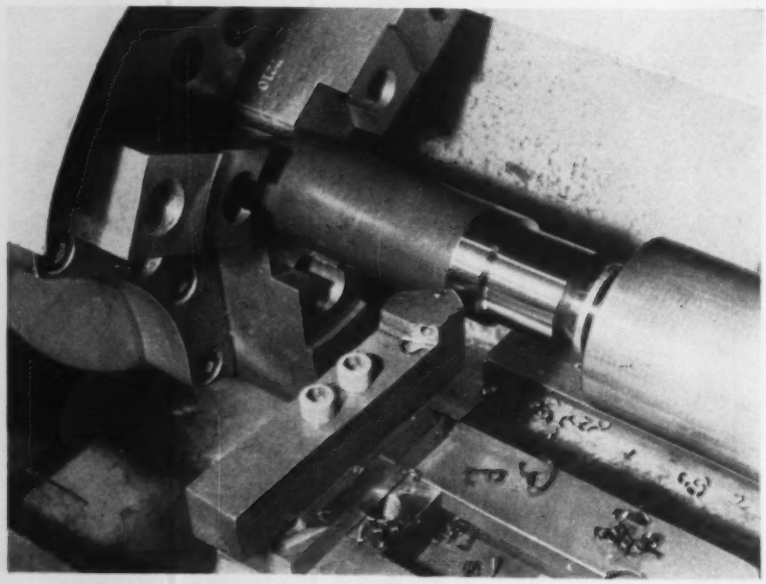
Whenever transfers are eliminated, savings become noteworthy. One of the illustrations shows such a transfer-free operation on a 6-in. diam roll.

Previous processing called for grinding. After turning, the steel rolls were transported to a cylindrical grinder. Transfer is now a thing of the past. The lathe operation insures both the desired finish and tight dimensional accuracy.

Operational data are interesting. Each roll has a hardness of 38 Rc. It's turned at 900 sfpm. Under these conditions, the precision - ground ceramic tool yields a 20-microinch finish. If the part was harder, the feed rate could be upped by 25 pct.

Milling vs. Shaping—Less dramatic, but of equal potential for savings, is the substitution of face milling in lieu of shaping. Let's consider the fabrication of a complex die block. Examination indicates that a change is needed in making these blocks.

At present, a carbide-equipped shaper does a good job in its own right. But, it's far more costly than face milling. However, this has been



NO GRINDING: Miracle oxides in the tool bit on this lathe yield good finishes. Thus, follow-up grinding or polishing isn't needed.

true only since the advent of the indexable, throw-away carbide-cutting tool.

In milling these die blocks tool-investment and reconditioning costs are greater than shaping-tool costs. Both shapers and mills use indexable throw-away carbide-cutting tools. Yet, each milling cutter represents a ten-fold greater investment than the shaper's single-point tool.

With the advent of the indexable, throw-away cutting tool, face milling takes precedence over shaping.

Relative savings in time remain about the same. The time to mill with the old-style brazed-type of carbide or non-indexable solid-carbide milling blade is about the same as for the latest design. But the time needed to change blades and to recondition the stations is greatly improved. Previously, due to this downtime, it wasn't economical to mill—in spite of the big reduction in machining time.

Face or Straddle?—The case against straddle milling is definite and conclusive. With today's methods and equipment, it's hard to justify any straddle-milling operation.

A breakdown of the equipment needed for straddle milling often is quite revealing. And, even with duplicate arbor setups, the time in the toolroom or on the layout bench must still be reckoned with. This time enters into the final-cost figures.

With straddle milling, vibration varies as the cube of the unsupported distance. This means that the outboard cutter is less rigid than its mate. Thus, it vibrates more. Hence, other things being equal, the outboard cutter requires more frequent attention and removal. An entire setup has to come down, whenever the outer cutter gets dull. Reconditioning the cutters also takes a lot of time.

Duplex Mill—Condemnation of straddle milling shouldn't be confused with duplex milling. Most of the drawbacks inherent in straddle-milling setups disappear in a duplex mill.

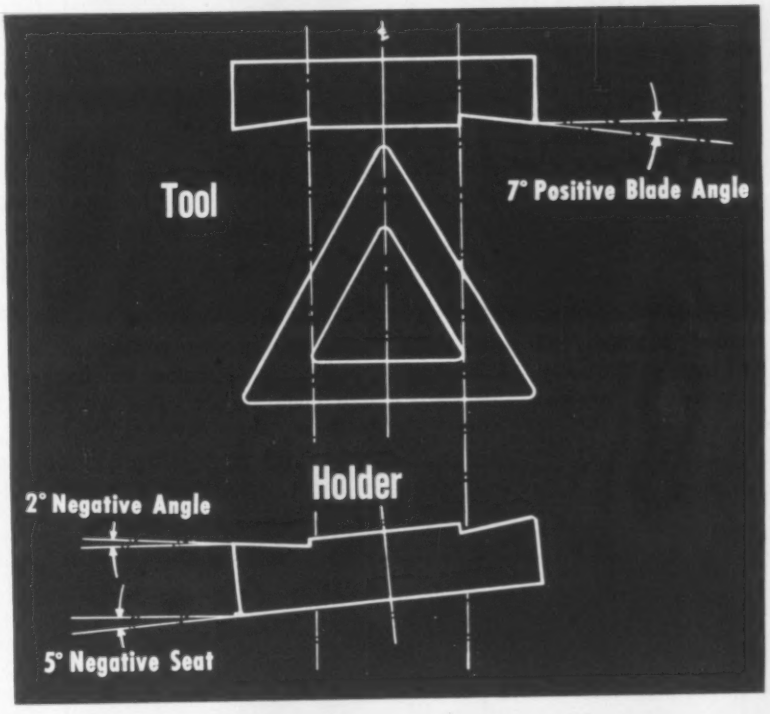
The job of making a duplex setup, with arbor cutters dimensionally accurate, is simple. A duplex mill keeps its outboard cutter stable at all times.

Stability offers a big bonus. It reduces vibrations. Elimination of vibrations, which cause abnormal wear, boosts machine-tool life.

Use of oxides in cutting tools and the introduction of precision-ground indexable and throw-away carbide blades have caused the birth of a host of new machining methods. New tools and new methods supersede techniques that have been in the saddle for more than 50 years.

EASILY CUT: At 250 sfpm, new tool cuts heat-treated steel with a hardness of 63 Rc. Cut depth is 0.1 in. Feed rate is 0.005 ipm.

Tool Has Six Cutting Edges



Two Passes Weld Heavy Plate

High Current Density Reduces Aluminum Welding Time

Production men are always looking for faster ways to fabricate.

Here's a technique for welding thick-aluminum plate that fills a joint in 10 fewer passes.

■ Welds in 2-in. thick aluminum plate can be made in just two passes. How's this feat accomplished? Researchers at Kaiser Aluminum & Chemical Corp., Oakland, Calif., say it's done by using high current densities.

The high current densities are obtained by using higher voltages and amperages than conventional Mig welding would require.

This welding development may extend the thickness range which can be production welded in two passes. By conventional welding practice, up to 12 weld passes are required to weld 2-in. aluminum plate.

Quality Welds—The new welding method produces full penetration and high weld quality. Mechanical properties of two-pass weldments are comparable to those for the same thickness welded by the multi-pass method.

The two-pass technique is applicable to both butt and fillet welds, but because of the large molten weld pool created, the process can be used only in the flat or down-hand welding position.

Although it is possible to use square-butt joint designs on plate thicknesses up to at least 1¼ in., it's better to bevel heavier plates to obtain full weld penetration and satisfactory bead crown. Correct alignment between the welding arc and joint is essential.

Higher Density—Multi-pass Mig welding, using 1/16-in. diam filler wire and argon gas, is usually done at currents below 300 amp and 30 v. In the new technique, currents up to 450 amp and 40 v are used with modified automatic welding equipment.

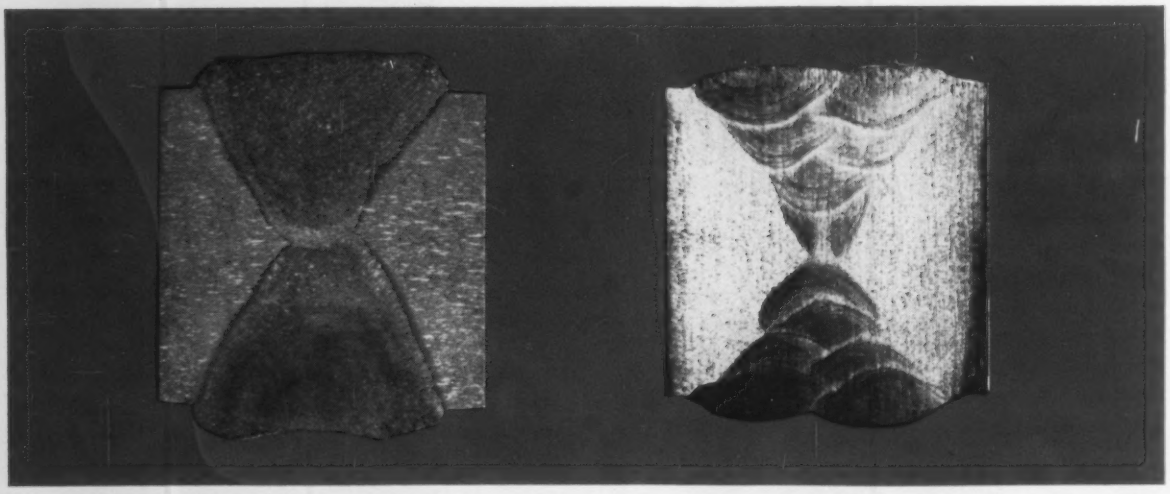
Greater penetration is obtained by increasing the wire feed rate until the greater portion of the welding arc is below the level of the plate surface. The arc length is not decreased, but it exhibits a deep penetration action.

Two-pass welding thus reduces arc time and the amount of shielding gas used by about 50 pct. In addition, the amount of edge preparation is reduced and smaller quantities of filler wire are required.

Three Factors—The high quality two-pass welds result from three important factors. First, the high current density produces a finer spray transfer of molten aluminum from the filler wire to the weld pool.

Next, the weld pool is large and molten for a longer period, and thus allows porosity-forming gases and oxide particles to escape more completely. Lastly, the fewer weld passes used in the new technique reduce the chances of weld contamination.

The two-pass method saves substantially where extensive welding of heavy plate is required. This is true particularly in pressure vessel, shipbuilding, ordnance and related applications.



FEWER PASSES: A cross-section of a two-pass weld, (left) in 5083 aluminum plate, with 1/16-in. diam 5183 filler wire. Conventional Mig methods require up to 12 passes to fill the plates' joint design.

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Hot Rolled Sheets	Alloy Sheets and Plates	Electric Weld Line Pipe
Hot Rolled Pickled Sheets		Spiral Welded Pipe

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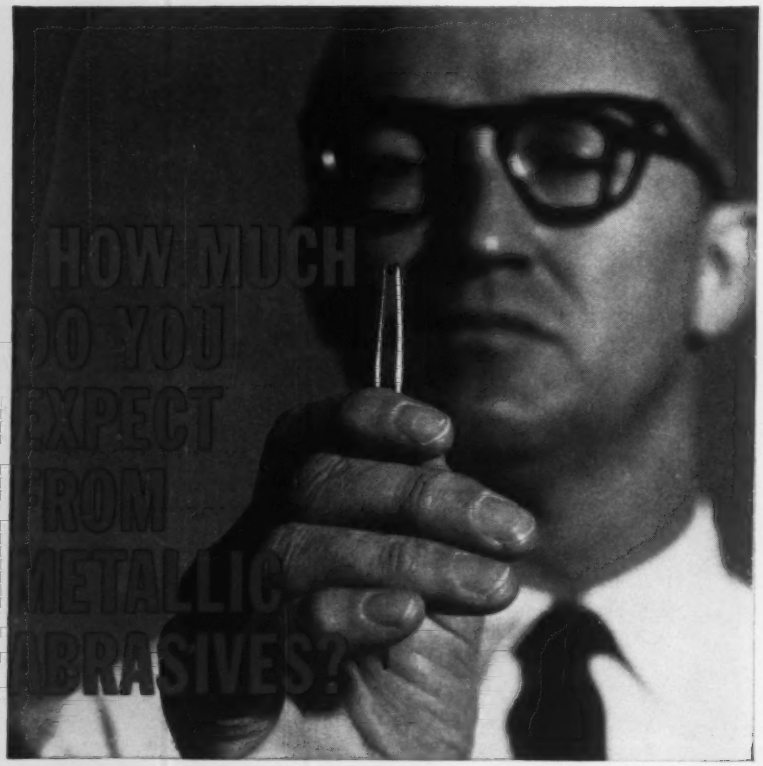

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PATENT REVIEW

New Patents In Metalworking

Gas-Cutting Powder

Iron powder composition for gas-cutting, gas-washing, and gas-scarfing, S. Nishikiori and Y. Okada, Jan. 10, 1961. An iron powder for gas-cutting purposes consists of a mixture of 10-90 pct commercial Fe powder and the remainder a powdered alloy comprising 40-90 pct Cu. The balance can be one of the metals Al, Mg, Si, Ca, Ti, and Zr. U. S. 2,967,767.

Hot-Formed Parts

Method of hot forming metallic articles, H. W. Gronemeyer (assigned to Armco Steel Corp., a corp. of Ohio), Dec. 27, 1960. In the production of scale-free metallic articles by a hot forging method, the scale is removed from the bar or rod stock by pressure between dies. This is done prior to shaping. U. S. 2,965,960.

Unburdens Furnace

Apparatus for removing burden from a blast furnace, C. W. Kandle, Jan. 10, 1961. A method removes a blast furnace burden by a single drill unit or by a plurality of circumferentially spaced drilling units. Burden is removed quicker, more safely, and with a smaller crew than when previous methods are used. U. S. 2,967,316.

Breaks Sinter

Sintering breaking apparatus, V. F. Koontz (assigned to Dravo Corp., Pittsburgh), Dec. 20, 1960. Design for an improved breaker breaks iron ore sinter cake into pieces of desired maximum size. No. 2,965,321.

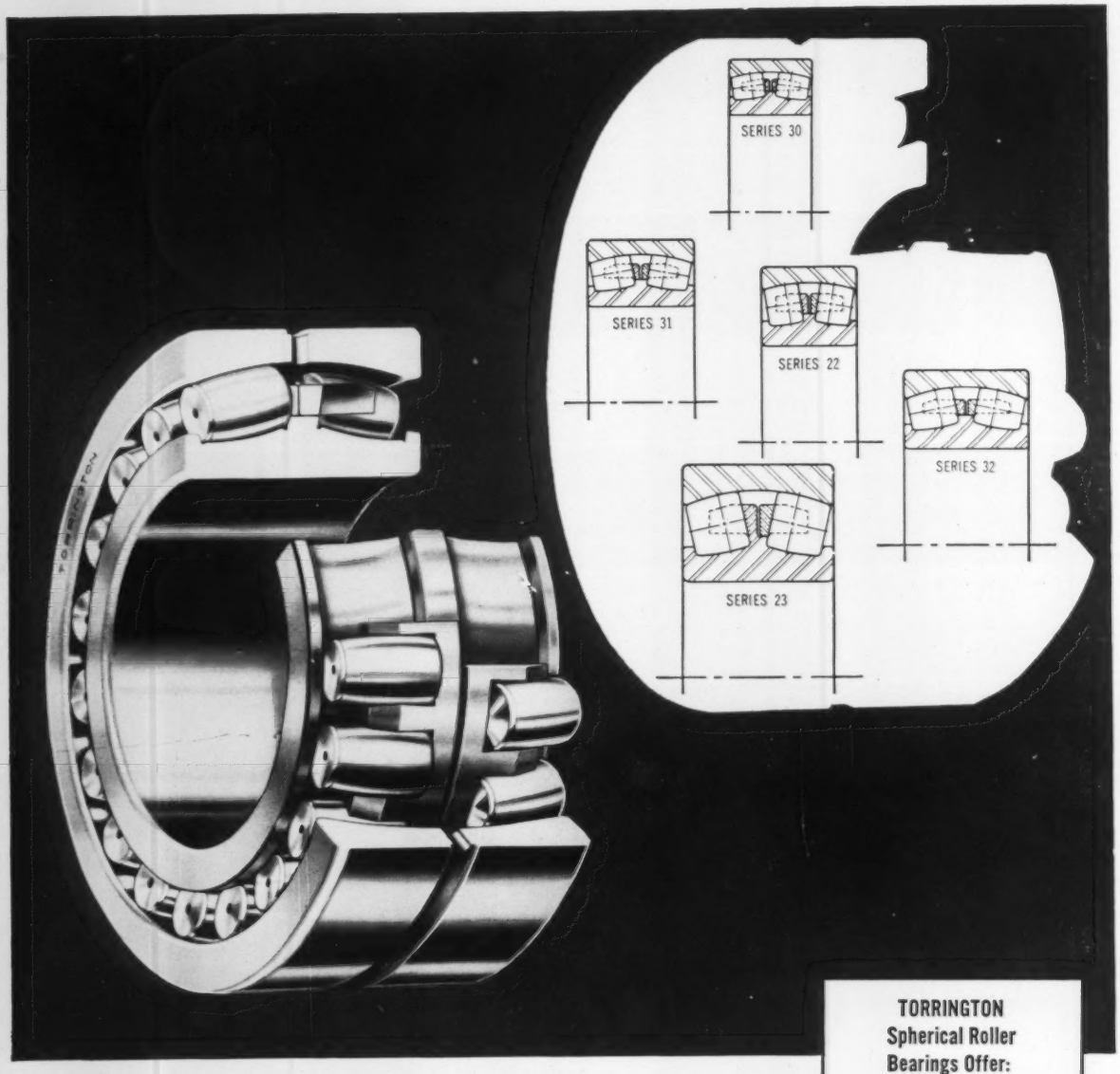
Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

BLAW-KNOX

Universal Slabbing Mills

Blaw-Knox designs and builds slabbing-blooming mills in a complete range of sizes in universal and high lift types. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and nonferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

46 x 90 inch Universal Slabbing Mill.



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Bearings matched *exactly* to the job pay off in better performance, longer life, greater reliability. That's why it pays to specify carefully. And that's why it pays to choose Torrington Spherical Roller Bearings.

Whatever your space limitations or capacity requirements, the five series of Torrington Spherical Roller Bearings provide the right bearing for virtually every industrial application. You can design for straight bore or tapered bore with adapter. You can benefit from extra features such as lubrication groove and oil holes, or selected outside diameters.

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TORRINGTON Spherical Roller Bearings Offer:

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- even load distribution
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New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Rotary Knife Cutters

Well illustrated, a technical catalog describes rotary knife cutters. Cutaway views and specification tables provide the user with full dimension and design information. (The Young Machinery Co., Inc.)

For free copy circle No. 1 on postcard

Electric Motors

Meeting a wide field of application requirements, electric motors are outlined in an eight-page bulletin. Twenty-three types of motors are featured with photographs. (The Louis Allis Co.)

For free copy circle No. 2 on postcard

Asbestos Mining

A verbal and pictorial visit of a Canadian mine and mill is presented in an eight-page brochure. Information is given in digest form. It includes mining, milling, quality control, research, packaging and shipping. (Carey-Canadian Mines, Ltd.)

For free copy circle No. 3 on postcard

Indexing Chassis

The operating features of a straight - line, indexing machine chassis are described in an eight-page brochure. The literature describes engineering features. (Swanson-Erie Corp.)

For free copy circle No. 4 on postcard

Loading Systems

A 12-page brochure covers automatic loading systems used with automatic barrel plating and processing equipment. The illustrated brochure contains case histories of a variety of automatic loading operations. (Metal Finishing Div., Frederic B. Stevens, Inc.)

For free copy circle No. 5 on postcard

Rust Protection

A four-page brochure describes zinc rich coating. It explains how it can be brushed or sprayed on iron or steel surfaces. This provides protection against rust and rust creepage. (The Sealube Co.)

For free copy circle No. 6 on postcard

Thermostats

Featuring exposed or enclosed bimetal disk thermal elements, commercial thermostats are described in a four-page bulletin. Technical details on optional features are also given. (Stevens Mfg. Co., Inc.)

For free copy circle No. 7 on postcard

Grinding Wheels

In full color, a brochure depicts types of surface grinding wheels, segments and disks. The brochure also illustrates the company's marking system which eliminates selection errors. (Jowitt & Rodgers Co.)

For free copy circle No. 8 on postcard

Processing Equipment

Photographs and specifications of 44 different items of equipment, for the mineral and chemical processing industries, are contained in an eight-page catalog. (Denver Equipment Co.)

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Lubricant Coating

The characteristics of a bonded lubricant for ferrous surfaces, are described in a data sheet. The two-page bulletin includes data from actual tests of the material on metal-cutting tools. Method of application is described and illus-

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FREE LITERATURE

trated. (The Alpha - Molykote Corp.)
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Semiconductor Bases

Stud - mounted semiconductor bases and mating caps are reviewed in a four-page technical bulletin. Various critical dimensional tolerances are detailed in the literature. (Standard Pressed Steel Co.)
For free copy circle No. 11 on postcard

Molding Compound

A molding compound of nylon and molybdenum disulphide is the subject matter of a four-page bulletin. The publication features a roundup of 45 application case histories. Latest physical property data are included. (The Polymer Corp., Molding Resins Div.)
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Lighting

Incandescent, fluorescent, combination and magnifying lamps are described and illustrated in a four-page catalog. The versatile lamps are portable, functional and precision made. (Luxo Lamp Corp.)
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Inspection Equipment

Non-destructive inspection equipment, for finding flaws in nonferrous, non-magnetic metals, is described in a four-page bulletin. Information on the components of the equipment and ease of operation is also supplied. (Magnetic Analysis Corp.)
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Gas Chromatography

For gas chromatography, a new ionizing instrument is described in an eight-page bulletin. It is illustrated with photographs and line drawings. In addition, the bulletin presents the highlights of ionization detection in gas chromatography. (Burrell Corp.)
For free copy circle No. 15 on postcard

Bar Automatic

The new design of a 2½-in., single-spindle automatic is described in a four-page bulletin. Its features are supplied with illustrations. Complete machine specifications are also given. (The Cleveland Automatic Machine Co.)
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Waterflood Valves

Plastic-coated and non-coated valves are discussed in an eight-page catalog. The valves are for waterflooding, secondary recovery and other pressure-maintenance systems. Cutaway drawings show valve interior details. (Edward Valves Inc.)
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Electrolytic Shaping

Described in a short bulletin is electrolytic shaping and how the company's electronically-controlled supply unit fits into the process. Photos show interior views of the unit. Specifications of the supply unit are also given. (Anocut Engineering Co.)
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Centrifugal Clutches

Automatic centrifugal clutches and clutch couplings are reviewed in a 42-page catalog. The publication provides a quick-reference guide and fact file on the clutches. (Formsprag Co.)
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Contour Milling

Numerically - controlled, horizontal die sinking and contour milling machines are described in a 12-page catalog. Operating advantages are listed in the catalog. (Giddings & Lewis Machine Tool Co.)
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Industrial Trucks

Profusely illustrated, a 40-page catalog provides pictures, descriptions and full specifications for a line of two-wheel and platform trucks. A double-spread chart gives recommended load ratings that can be comfortably handled on a particular truck. (The Fairbanks Co.)
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Strips Copper

Described in a technical data sheet is a material for stripping copper from printed circuits. The liquid, chromate-type material contains a catalyst to give it a high stripping rate. (MacDermid Inc.)
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O-Cedar put the squeeze on high assembly costs when they redesigned their famous squeeze mop. The first money-saving step was to call in Tinnerman fastening experts.

The result was a one-piece spring steel SPEED CLIP which replaced three separate parts and eliminated a riveting operation. This new fastener locks itself in place on the squeeze plate, and holds it up and out of the way when snapped over an anchor tab provided on the mop base. Live spring action assures positive retention for full mop life.

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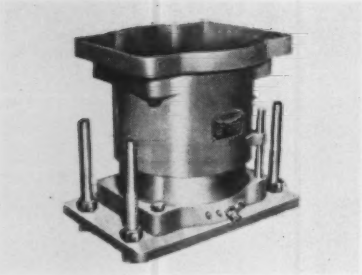
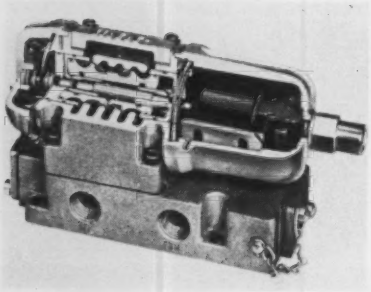
New Materials and Components



Die Cushion Functions in All Power Presses

This universal die cushion gives complete overall ring holding pressure, on practically any power press. This is possible even without the requirements of a press bed pit. The new minimum overall height can be provided for bolster plate mounting or press bed mounting. With this goes a hardened and ground pin pressure pad. It's custom made to fit the entire press bed opening. The cushion comes complete with combination pressure gage, regulator valve; necessary fittings. (Dayton Rogers Mfg. Co.)

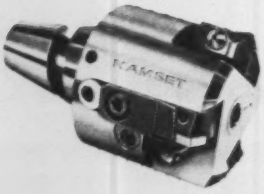
For more data circle No. 25 on postcard, p. 125



Bearingizing Air-Valve Parts Reduces Friction

For years, use of pneumatic circuitry was limited. This was due to design deficiencies in air valves. A new concept for solenoid-operated air valves, and use of bearingizing tools in their production, provide valves with efficient design. Internal pressures are balanced. Operating force is small. The bearingizing tools meet the rigorous requirements of the valves. The internal body openings, and several diameters on the two spool retainers, are bearingized to reduce friction. A function of initial part preparation, the bearingizing process means precision. (Cogsdill Tool Products, Inc.)

For more data circle No. 26 on postcard, p. 125



Boring Cutter Gives Fast Multi-Point Boring

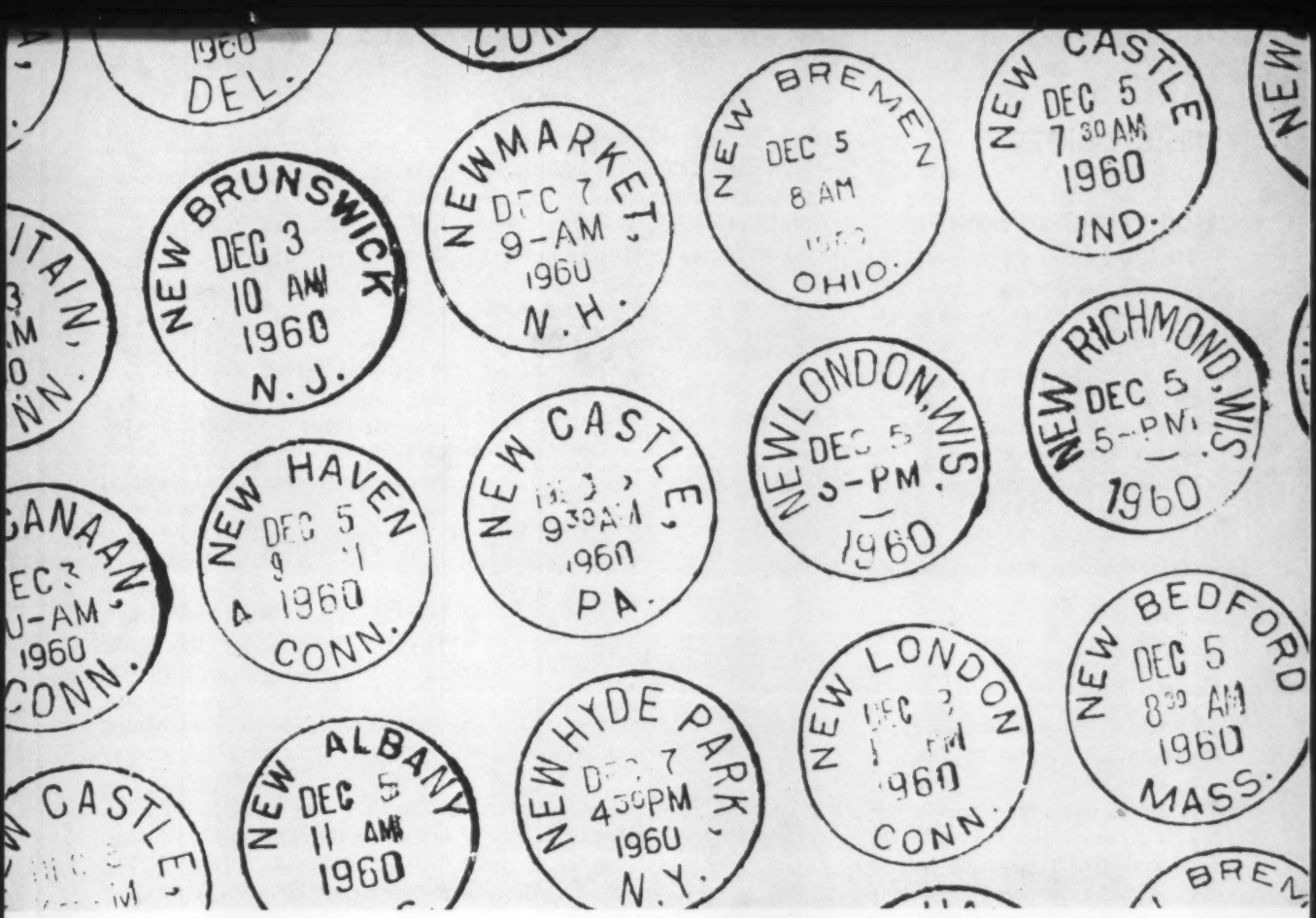
Utilizing throwaway inserts, a precision boring cutter develops fine finishes and boring tolerances in tenths. It features an individual cartridge adjustment for initial setting. An unusual micrometer adjustment provides insert control during the production run. Multi-point design reduces chipload per cutting edge. It permits higher feed rates and shorter machine cycles. The tool's throwaway inserts are instantly indexable and adjustable. They minimize tool changing and adjusting down-time. Several auto manufacturers using the tool claim large increases in production and cost saving. (Valenite Metals, a div. of The Valeron Corp.)

For more data circle No. 27 on postcard, p. 125

Hardsurfaced Shafts Give Longer Service Life

Long service life of a part is an asset to anyone. In a logging truck operation, shaft service life posed as a problem. Normal shaft life for new cam and shaft assemblies is anywhere from 8-18 months. Various processes to prolong this were tried. None proved successful. However, when a hard-surfacing method was employed, service life was estimated anywhere from 30-50 months. The worn shafts were reclaimed in the following manner. An even coating of alloy powder was applied to a ground and grit-blasted shaft. Compressed air through a pistol propels the powder. From the pistol nozzle, an oxy-acetylene flame propels the powder. Then, the powder is welded to the shaft by use of a conventional oxy-acetylene torch. Finish grinding completes the economical method. (Wall Colmonoy Corp.)

For more data circle No. 28 on postcard, p. 125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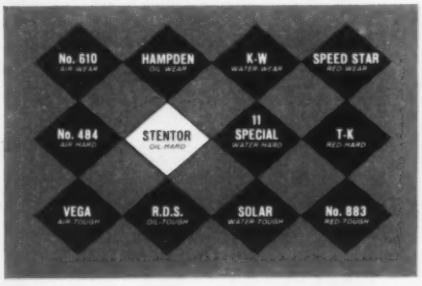
Wherever your tooling operation is located... here's a low-cost answer to common headaches



From New Haven to New Castle and points West . . . wherever toolmen want a simplified, low-cost answer to many tooling problems . . . Carpenter STENTOR (Oil-Hard) enjoys tremendous popularity. Here's why: STENTOR is one die steel you can live with. Its sound, uncomplicated analysis . . . free from hard-to-machine alloys . . . saves as much as 10% in machining costs. STENTOR is easy to heat treat . . . hardens at a low temperature of 1425°F to 1525°F. You'll like its freedom from decarb because STENTOR holds size so accurately many people do not even grind STENTOR tools after hardening. Little wonder it is the most widely used of all die steels in the Carpenter Matched Set of twelve! Put through an order now—you can get prompt delivery from your nearest Carpenter Service-Center.

Carpenter steel

You can do it ***consistently*** better with Carpenter Tool and Die Steels

Tool Steel

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

Hollow Teflon Spheres

Hollow spheres of high-density "Teflon", provide a permanent solution to flotation problems in highly-corrosive fluids. The thin, tough walls give a high degree of flotation. A 4-in. diam size ball weighs only six oz. But, it supports a weight of more than ¾ lb in water. Their near perfect roundness indicates use in ball check valves. Use is also found in flow meters, float valves and float level indicators. (Chemplast, Inc.)

For more data circle No. 29 on postcard, p. 125

Gear Motor

Designed for continuous duty, a sub-fractional four-pole, shaded pole gear motor operates at lower speed. This insures more quiet and longer life. It comes in three sizes, 1/30, 1/60 and 1/100 hp. Nine speeds take in the range of from 1-200 rpm. The gear motor meets many specifications calling for dependable high-torque performance. It is fan cooled with precision cut gears and oil impregnated bronze bearings. (von Weise Gear Co.)

For more data circle No. 30 on postcard, p. 125

Changeable Die

An upper press brake die has changeable radius inserts. It does the job of several radius dies.

Radius bends from zero to ⅜ in. can be formed using one unit by changing the radius insert. Ten interchangeable inserts are provided with each die. A total of 13 different radii are possible to form with one die. They may be used on standard press brakes and punch presses. Changing from one radius to another is a matter of seconds. Simply unhook the spring on each end, remove the die and replace it with another. (O'Neil-Irwin Mfg. Co.)

For more data circle No. 31 on postcard, p. 125

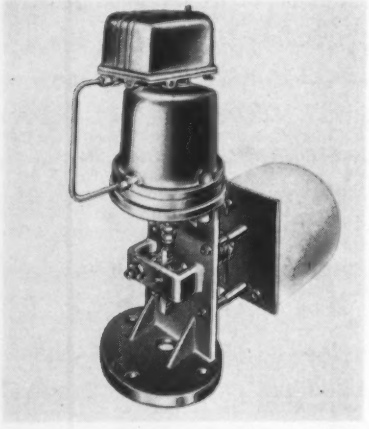
Tap Holders

All machines with reversing spindles can use these versatile tools as either releasing or non-releasing tap holders. In effect, they convert any machine into a precision tapping machine. The self-feed feature, if employed, guarantees the production of gage perfect threads. This holds true even when used for reentry with finishing taps for tapping in two operations. There is no thread distortion or double threading. (Tapmatic Corp.)

For more data circle No. 32 on postcard, p. 125

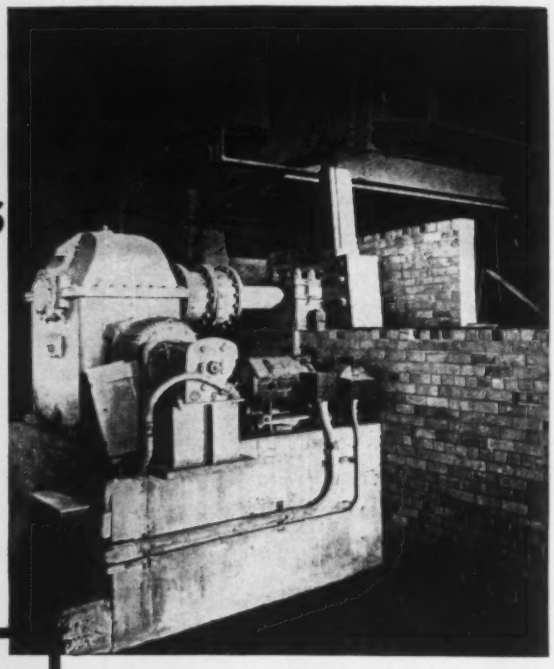
Positions Rheostat

A pneumatically-operated piston actuator, combined with a rack and pinion, converts the linear motion of the piston rod to rotary motion.



This actuator then positions a rheostat in response to a pneumatic signal. It produces 185 in.-lb of torque with a 40-psig air supply. At full piston rod travel (4 in.), the rheostat rotates 360 degrees. In this

Tilting 700-tons of steel furnace



CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

Here's a closeup of tilting mechanism for an electric furnace. Standard, stock model, double-reduction Cone-Drive **double-enveloping worm** gear speed reducer tilts furnace and heat with combined weight of 700 tons.

Powerful Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

way, a 1:1 ratio exists between piston rod travel and rheostat rotation. (Fisher Governor Co.)

For more data circle No. 33 on postcard, p. 125

Cadmium Conversion

Inexpensive, a single dip, chromate conversion process for cadmium enhances the brightness of the cadmium deposit. It also produces a clear chromate surface and is very easy to operate. No subsequent leaching is necessary. Chief use of the process is as a protective coating for hardware and other cadmium-plated products requiring long shelf life. (Hanson-Van Winkle-Munning Co.)

For more data circle No. 34 on postcard, p. 125

Connectors

Split-eyelet connectors save money in piping and tubing installations. They install quickly and easily to continuing or un-cut pipe

or tube lengths. The connectors are used in place of reducer Tees, and to connect such parts as spray nozzles, gages and hose nozzles. The split clamp is made of cadmium-plated, heavy-gage steel or of stainless steel. The connectors may be used for liquids and gases up to pressures of 150 psi. (Spraying Systems Co.)

For more data circle No. 35 on postcard, p. 125

Chromallized Vanes

To be installed in J-75 jet engines, rows of chromallized tur-

ABRASION RESISTANCE

A CASE IN POINT—Under highly abrasive conditions dust and fly ash collector tubes such as these used to give out in less than a year. Ni-Hard castings were an obvious yet difficult answer because the 38" length with 5/16" section was hard to cast. Where others failed Hamilton Foundry succeeded in casting these in production quantities for Western Precipitation Multiclones. The hardness (up to 700 Brinell) and metallurgical structure of Ni-Hard make it one of the most abrasion resistant materials commercially available today. Tubes from Hamilton Foundry Ni-Hard now last more than five times as long as before.

When buying castings, the skill and integrity of Hamilton Foundry is your best insurance that specifications—and delivery schedules—will be met.

GRAY IRON • ALLOYED IRON • MEEHANITE® • DUCTILE (NODULAR) IRON • NI-RESIST • DUCTILE NI-RESIST • NI-HARD

HAMILTON FOUNDRY INC.

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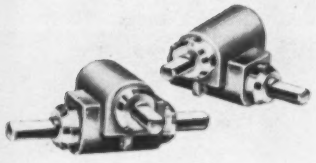
bine vanes resist high-temperature oxidation. Chromallizing is a patented method of diffusing chromium and other elements into steels, super-alloys and refractory metals. (Chromally Corp.)

For more data circle No. 36 on postcard, p. 125

Angle Drives

A T-drive and right-angle drive provide a stronger attachment for coupling ends. They are provided with ¾-in. diam shafts cut to a 1/16-in. flat. Primarily used with



flexible shafting, these new adapters allow for a variety of uses. The drives are constructed of aluminum alloy housing, steel gears and use oiltite bearings. Ultimate static torque capacity is 25 lb-in., with a backlash of 6 degrees. (F. W. Stewart Corp.)

For more data circle No. 37 on postcard, p. 125

Outwears Rubber

Tougher than rubber, a new material outwears rubber and withstands torque load. It also minimizes shock from torque load. Flexible coupling inserts is just one of its many uses. (Shurclose Seal Co.)

For more data circle No. 38 on postcard, p. 125

Infrared Burner

Gas-fired, an infrared burner was designed specifically for low-temperature industrial processing applications. Such applications are: drying metals; curing shell molds and foundry cores; drying porcelain-enamel frit, drying moist fabrics, and paint and enamel baking. Infrared radiant heat emission of the new burner is concentrated in the 2.0 to 4.0 micron band. The burner is designed for optimum heat transfer efficiency. Face temperature of the 4- x 18-in. burner screen may be regulated up to 1800°F; nominal heat input is 30,000 BTU/hour per unit. Units have built-in flame adjustment. Burners have cast-iron integral manifolds, and can be assembled into continuous lines up to 100 ft long. (Bryant Industrial Products Corp.)

For more data circle No. 39 on postcard, p. 125

Dry-Type Transformers

In single and three phase construction, a standardized line of dry-type transformers is primarily for indoor installation. The new line is designed to deliver quiet, economical performance in plants. Each model is design-checked to operate at 4 to 5 decibels below new 1960 NEMA standards. All core and coil assemblies are thoroughly tested to conform to both NEMA and ASA specifications. The transformers occupy minimum space. Termi-

Stamco has a new, compact and streamlined design

...Rated 3 cuts of 3/16" mild steel.

Important advances in design and material make this unit the finest at the lowest possible cost.

Stamco is proud to announce the "All Purpose" Slitting and Coiling line. Years of engineering study have resulted in the development of this outstanding slitting equipment. These years of research are reflected in unusual features of this line.

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Line as shown is complete with control desk and all electrical and hydraulic equipment.

Slitting and Coiling Lines • Cut-to-Length Lines • Flying Shear Lines • Power Squaring Shears • Continuous Process Lines • Ferrous & Non-ferrous Mill Equipment

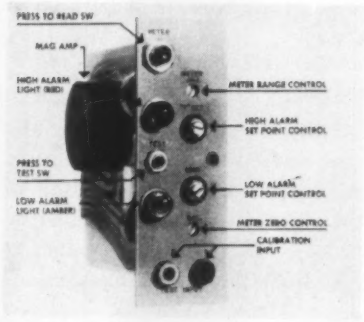
Stamco, Inc.
New Bremen, Ohio, U.S.A.

nal arrangements and liberal wiring area permit primary and secondary cable entrance from either end of the enclosure. Terminals are designed for connecting copper or aluminum cables. (Niagara Transformer Corp.)

For more data circle No. 40 on postcard, p. 125

Monitors Temperatures

A solid state alarm unit monitors temperatures in foundries, furnaces and metalworking plants. The device indicates over-limit temperature conditions in furnaces, mills, motor bearings and electrical equip-

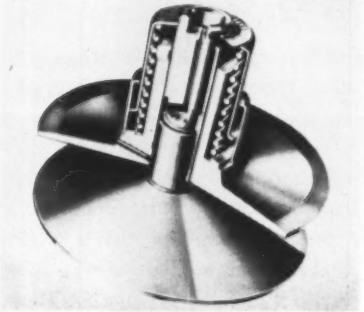


ment. The alarm unit immediately indicates off-normal conditions both visually and audibly, on local and/-or remote indicators. (San Diego Scientific Corp.)

For more data circle No. 41 on postcard, p. 125

Motor Pulley Drives

Offering variable-speed operation, motor pulley drives come in ratings of from 1-15 hp. Output



speeds range from 2200-141 rpm. A 3:1 speed variation utilizes 1750 rpm or 1160 rpm motors. The drives incorporate the power transmission of a V to V drive and simple motor pulley design. (Sterling Electric Motors, Inc.)

For more data circle No. 42 on postcard, p. 125

Variable-Speed Drive

Every revolution per minute between 180 and 1800 is obtainable from a variable-speed drive unit. Using a 1200 rpm motor, all speeds between 120 and 1200 are possible. Either drip-proof or totally-enclosed fan-cooled units can be furnished, in ½, ¾ or 1 hp. The incorporation of a four-speed transmission results in three times greater torque at the low speeds. A simple control regulates the output shaft to the desired revolution per minute. (The Lima Electric Motor Co., Inc.)

For more data circle No. 43 on postcard, p. 125

INSPECTION PROJECTOR MAGNIFIES FOR ® QUALITY...

Our inspection projector magnifies cutting edges to eliminate the minute angular deflection that could cause you costly production losses . . . just one of many inspections that account for Circle R quality.

CIRCLE R saws, slitters and combination center drills must submit to constant exhaustive inspection to work their way to you. They've got to prove they can ensure you correct cutting angles, long service, and minimal downtime.

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DETROIT — J. L. Bradford Associates
HACKENSACK — The Eaton Company
INDIANAPOLIS — Donald McIntire
MEMPHIS — Branch-Marwin Tool Specialists
MILWAUKEE — Ford Tool Company
MONTREAL — Humphrey B. Walton
NEW HYDE PARK — The Eaton Company
NEW YORK CITY — J. V. Crommelin (Export)
PHILADELPHIA — General Tool Sales Co.
PHOENIX — DiEugenio Tool Center
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NEW BOOKS

"Cobalt: Chemistry, Manufacture and Uses," edited by Roland S. Young. This book contains all the latest information on the production and consumption of cobalt in all its forms. Leading authorities in the field discuss the occurrence, extractive metallurgy, properties and compounds of this metal. In addition, the book includes a complete survey of the many new industrial applications of cobalt developed in the past ten years. 424 pp. $15.00 per copy. Reinhold Publishing Corp., 430 Park Ave., New York 22.

"Heat Treatment and Properties of Iron and Steel," by Thomas G. Digges and Samuel J. Rosenberg. This monograph gives general information concerning the heat treatment of iron and steel. It also gives explanations of such processes. In addition, the book contains a working knowledge of the basic theoretical and practical principles involved in the heat treatment of iron and steel. The effects of various treatments on the structures and mechanical properties of these materials are described. 40 pp. $0.35 per copy. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

"X-Ray Metallography," by A. Taylor. It is both a theoretical and a practical book. Its main theme is the application of X-ray techniques to the study of metals and their alloys. The book also includes references to analogous neutron and electron diffraction procedures. A detailed description is given of the apparatus and experimental procedures required in the solution of real problems. Some of the subjects discussed are: production of X-rays; X-ray absorption and both X-ray and neutron radiography. The appendix includes many useful tables. 993 pp. $27.00. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16.

"Feasibility Study of Large Diameter Anti-Friction Bearings for Radar Antenna Applications," summarizes the present state of the art of large bearing design. It includes detailed discussion, formulas and other specific data on all types of ball and roller bearings. The book investigates the methods for obtaining bearings having the maximum load-life capacity for support systems. An example of such a system would be one needed for very large rotating antenna systems. 227 pp. $25.00 per copy. The Kaydon Engineering Corp., Muskegon, Mich.

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handles more air with minimum pressure drop

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Handles any job in your shop using 3/4" to 1/8" connections – from the air line to the air tool – eliminates any need for various size couplings in hook-up – makes it easy to keep stock of parts in balance – holds inventories to a minimum.

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Has fewer parts. Locking ring provides positive lock...tight fit...minimum wear. Equipped with automatic sleeve lock.

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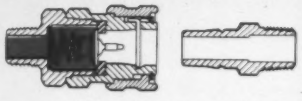

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Quick-Connective Fluid Line Couplings for... COMPRESSED AIR HYDRAULIC FLUIDS • OIL • GREASE • WATER VACUUM • STEAM • OXYGEN • ACETYLENE REFRIGERANTS • GASOLINE • COOLANTS • LP-GAS

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Here is an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes and types of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings.

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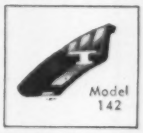
ENGINEERED OIL SEALS for Steel Mills

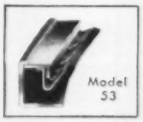
Garlock KLOZURE* Oil Seals (left) help keep lubrication in, dirt out of roll neck bearing at Inland Steel's East Chicago mill.

Inland Steel applies Garlock KLOZURE Oil Seals for protection of mill roll neck bearings at East Chicago.

Minimizing lubrication leakage from the inboard and outboard ends of the bearings, Garlock KLOZURE Oil Seals provide more constant service as the rolls change position in a lateral movement during operation. Inland finds, too, that in atmospheres of dirt, scale and spray, KLOZURE Oil Seals help keep foreign particles from entering—and damaging—the bearings.

For good, economical bearing protection, Inland joins the growing list of steel producers who use Garlock KLOZURE Oil Seals. Wherever you look in mills, you'll find a specific type of KLOZURE Oil Seals doing a specific job. Model 142, for instance, helps keep water splash and scale out of bearings at the shoulder of mill rolls. Models 64 and 82 protect bearings on back-up and work rolls. Model 53 is recommended for table rolls at normal and high speeds. Model 23 Split KLOZURE is ideal where equipment cannot be dismantled too easily.





Designed for peak efficiency and durability, Garlock KLOZURE Oil Seals resist oil and grease, are impervious to water, mild acids, alkalies, withstand temperatures from −40°F to +250°F. For extreme conditions, Garlock furnishes sealing elements resistant to practically any fluid, and serviceable as high as +500°F.

If you have a particular sealing problem, why not discuss it with your Garlock representative. He's backed by over 70 years of experience in engineering, production and application. Call him at the nearest of the 26 Garlock sales

GARLOCK

offices and warehouses throughout the U. S. and Canada. Or, write for Catalog AD-181, Garlock Inc., Palmyra, New York.

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Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

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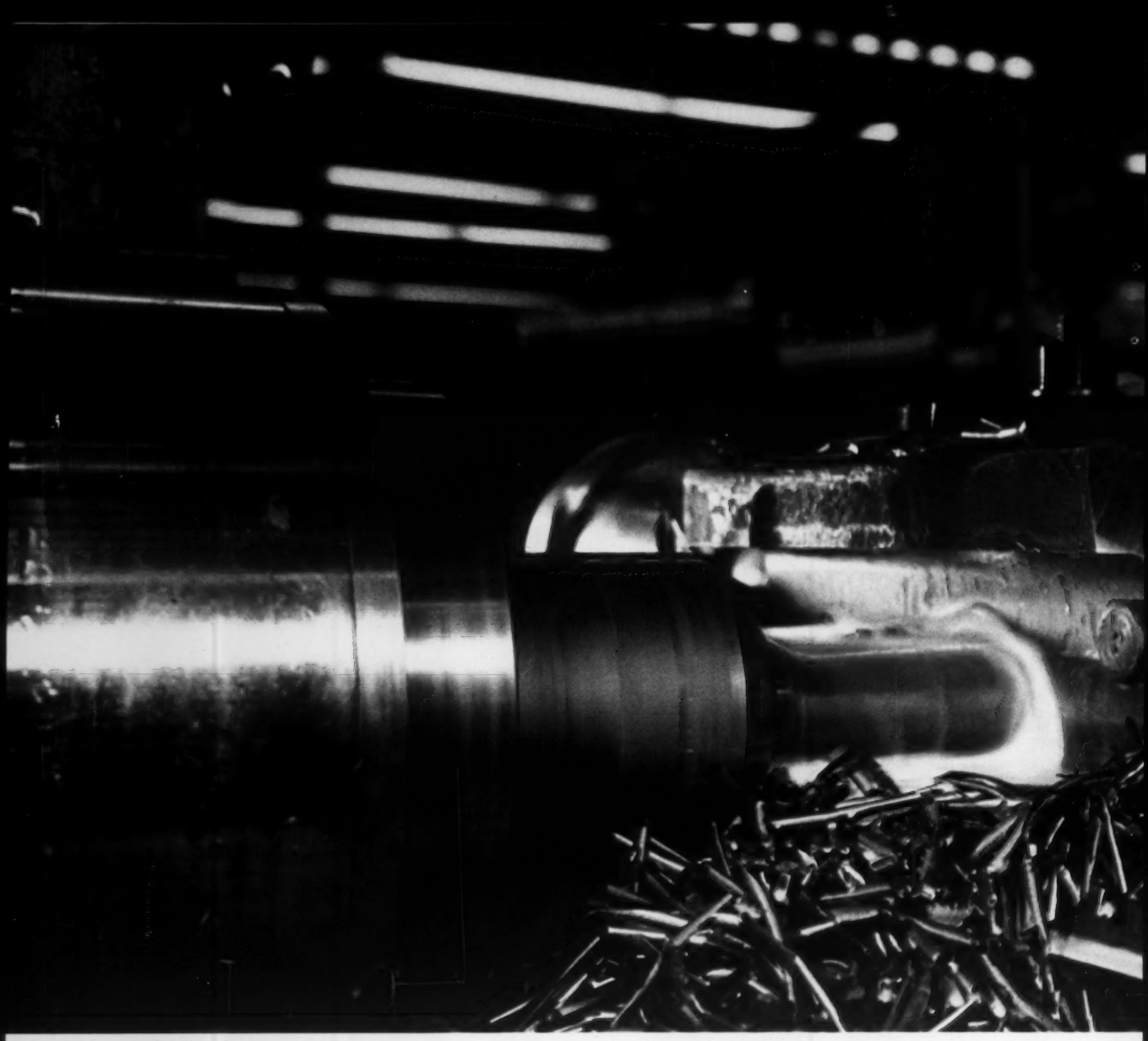


Landing gear manufacturer ups tool life with Gulfcut Heavy Duty Soluble Oil . . .

Menasco Manufacturing Company is a well-known builder of precision components for aircraft and missiles. In fact, most military and commercial jet aircraft use Menasco landing gears.

Menasco is continually searching for better and more economical cutting fluids. Recently, this outstanding firm switched to Gulfcut Heavy Duty Soluble Oil—a heavy duty water soluble coolant. Why? For two reasons: (1) versatility in many of the complex machining operations of high strength steels and (2) superior corrosion resistance.

This fine oil provided a forty percent increase in tool life in its first test—a figure that still holds! And because Gulfcut Heavy Duty Soluble Oil lasts longer, Menasco has been able to reduce coolant purchases by fifty percent.

"How can you put a dollar figure on so many benefits?" asks Mr. Stevens. "All we know is that savings on initial cost, better tool life, and reduced maintenance add up to a very healthy total."

If you've got a machining problem, try Gulfcut. And see for yourself why Gulf makes things run better! Just call a Gulf Sales Engineer at your nearest Gulf office. Or, write for detailed booklet.

Milling a slot 14 inches long by 2¾ inches deep by 2 inches wide in an AISI 4340 steel. It's only one of 450 operations in producing main motor yoke for a Bell helicopter. The coolant: Gulfcut Heavy Duty Soluble Oil.

40%, cuts coolant costs 50%, GULF MAKES THINGS RUN BETTER!

GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

GULF

Final inspection. T. C. Stevens, left, Assistant Superintendent of Manufacturing, and Frank Mauro, Gulf Sales Engineer, inspect a main landing gear assembly for a B-58 jet.

SP-9992

NEW TOOL STEEL SERVICE

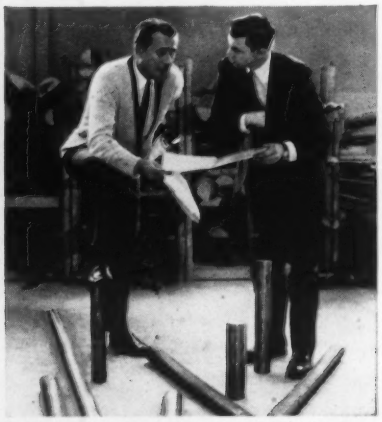
cuts
inventory
costs

Using too many grades of tool steel can lead to over-stocking —

that's when you need the benefits of Crucible's new Tool Steel Service!

A Crucible Service Engineer can prove that buying a few basic grades —

in quantity — enables you to carry fewer pounds in stock . . .



gives you a lower price per pound (you eliminate small quantity "extras"),

and with fewer grades to identify, you reduce the possibility of "mixed" steel.

All through standardizing on a few basic steels!

For the full story on this cost-reducing service, call in a Crucible Service Engineer

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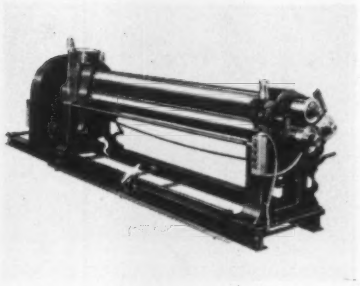
New Equipment and Machinery



Metal-Forming Roll Performs Double Duty

A new combination metal-forming roll does the job of several machines. The unit's rolls have extended journals with adjustable guide rollers and interchangeable roll heads. These make it possible to shape flat and round bars in addition to angles, tees and channels. Controls are located at the operator's position. The sheet bending roll handles sheet thicknesses from 20 gage to 7/16 in. in widths to 122 in. An angle bending roll will take angles from 1x1x¼ in.-2½x2½x¼ in. The overall machine is extremely husky. (Hendley & Whittemore Co.)

For more data circle No. 45 on postcard, p. 125

Palletizing Disks Agglomerate Many Materials

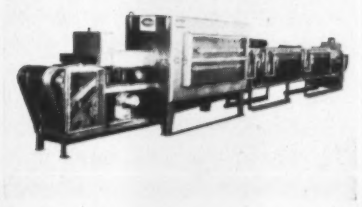
Palletizing disks, once used primarily for preparing iron ore or cermet-sinter mixes, are now being successfully used for the agglomeration of an ever-widening range of grandular materials. The conversion of fines and powders of various types into pellets large enough for commercial use has been the object of more than four years of tests. The palletizing disks have great potential in many fields. These include: Ferrous and non-ferrous mining; chemicals and fertilizers; glass, ceramics and clay; cement, lightweight aggregate, limestone and coal. The disks pelletize powdered materials by a rolling or "snowballing" action in which a small nucleus builds up in size as it travels around the disk, picking up fines that are fed onto the disk at a continuous rate. Water or other liquids increase particle adherence. (Dravo Corp.)

For more data circle No. 46 on postcard, p. 125

Micro Slicer Cuts Metal Ingots to Wafer Size

A unique slicer machine cuts costly metals into wafers as thin as 0.01 in. The micro slicer uses a new concept in slicing friable metals. First of all, it does not use a saw band. Instead, the slicer has a thin cutting wheel with an open center. Circling the inside opening of the wheel is a diamond cutting edge. The ingot of metal to be cut is positioned through the inner opening in the wheel. Slicing is done automatically. Cutting wheels are only 0.006 and 0.010 in. thick. These thin wheels reduce the amount of material lost during cutting operations. One application is the semiconductor industry. (The DoAll Co.)

For more data circle No. 47 on postcard, p. 125



Shields Reduce Heat Loss in Conveyor Furnace

Electrically heated, a conveyor muffle furnace has an alloy muffle. Therefore, the furnace is ready for use as soon as operating temperature is reached—even after weekend shutdown. It can be used for atmosphere controlled continuous-copper brazing, annealing or bright hardening of stainless steel parts. Special radiation shields, at each end of the heating chamber, reduces radiant heat loss. (Sunbeam Equipment Corp.)

For more data circle No. 48 on postcard, p. 125

NEW EQUIPMENT

Manipulates Billets

Three hundred and sixty billets can be charged and discharged automatically in and out of rotary hearth furnaces with a multi-position manipulator. The unit can handle billets from 2-6 in. in diam and from 4-30 in. in length. This design can be altered to handle larger size billets. The design of the manipulator includes two gripper heads, all necessary pneumatic cylinders, solenoid operated control valves, and limit switches. (Fordees Corp.)

For more data circle No. 49 on postcard, p. 125

Analyzes Vibration

A vibration signal analyzer and portable balancer studies and analyzes the vibration sources in machinery, buildings, and pipe lines. The unit uses modular construction and complete transistorized circuitry. Another feature is its low power consumption. The complete unit, including the stroboscopic light, may be operated on an internal battery-pac when complete

portability is required, or on standard 110 vac. The unit adapts to any type of transducer through the use of a complete family of plug-in input adapters. The voltage selection can be varied from 50 microvolts to 100 v. (RayData Corp.)

For more data circle No. 50 on postcard, p. 125

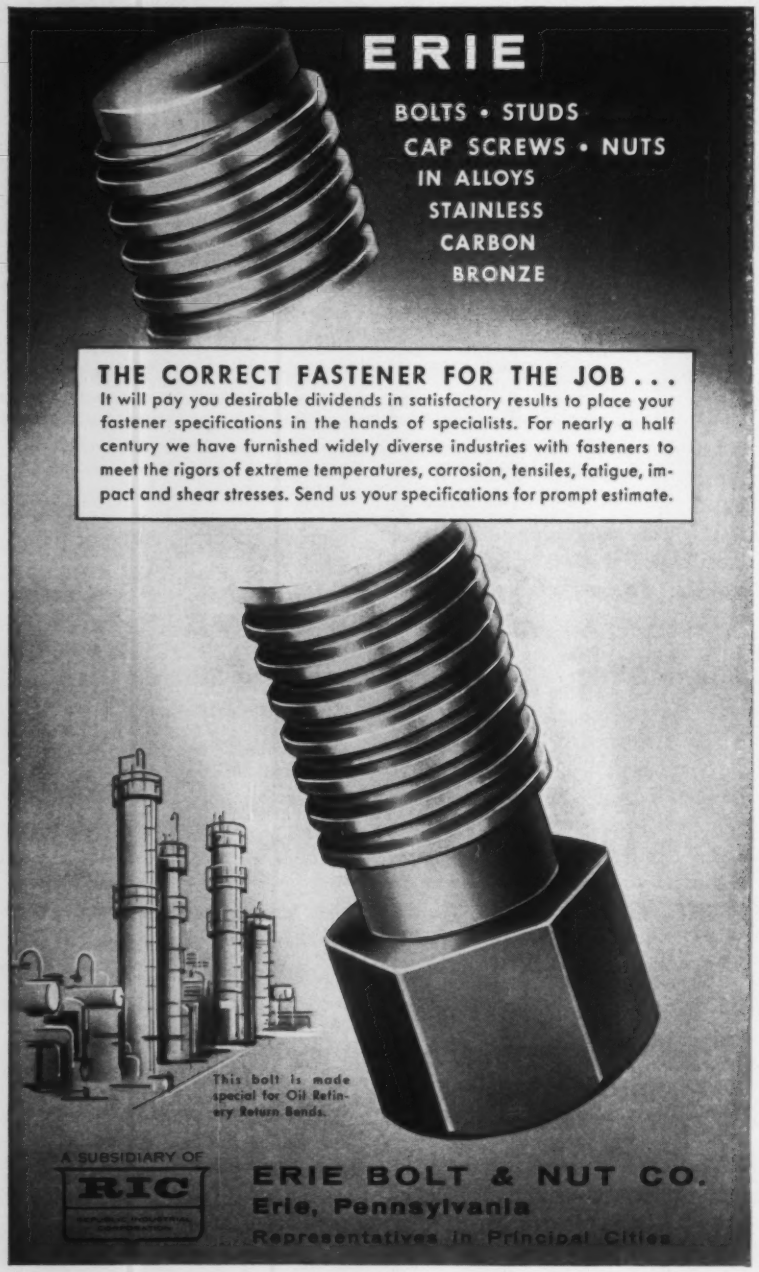
Electro-Machining

Die blocks measuring 3 ft x 4 ft, and weighing up to 6000 lb can be electrical-discharge machined. The unit stands 7 ft high, weighs 3500 lb, and occupies 81 x 103 in. of floor space exclusive generator and electrical power pack. The unit rough removes metal at 6 cu in. per hour. Ratio of metal-to electrode wear in the roughing operation is from 30:1 to 50:1. Designed on the building block style, the unit is quite versatile. Electrodes as heavy as 500 lb and as small as 0.005 in. diam can be run on the same machine. (Easco Products, Inc.)

For more data circle No. 51 on postcard, p. 125

Drill Grinder

A completely new concept in a precision drill grinder is capable of producing and reproducing any desired point on any drill from #80 to .250 in. diam. This is the range where hole accuracy and drill life present the most acute problems. Unique features of this pre-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BOLTS • STUDS
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THE CORRECT FASTENER FOR THE JOB . . .
It will pay you desirable dividends in satisfactory results to place your fastener specifications in the hands of specialists. For nearly a half century we have furnished widely diverse industries with fasteners to meet the rigors of extreme temperatures, corrosion, tensiles, fatigue, impact and shear stresses. Send us your specifications for prompt estimate.
This bolt is made special for Oil Refinery Return Bends.
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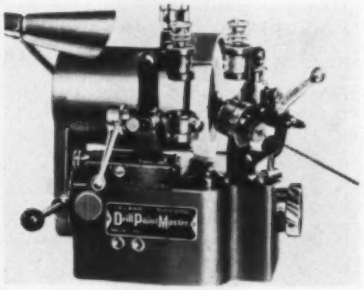
cision drill grinder include: independent adjustment of point angle, lip length and relief angle; two variable power microscope viewers and sealed beam light to assist in precise setting. The point angle is adjustable from 60°-180°; lip relief

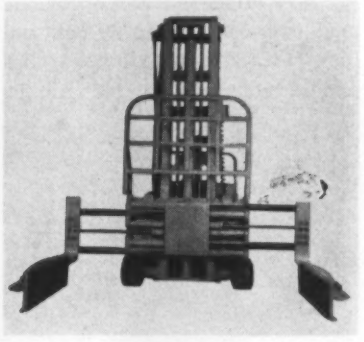


from 0°-26°. Point thinning is controlled to .001 in. by micrometer adjustments of wheel slide and point thinning carrier. All settings can be logged for exact duplication at any time. (Leland-Gifford Co.)

For more data circle No. 52 on postcard, p. 125

Rubber Faced Arms

Palletless handling of various sized loads is a feature of a low-silhouette type material handling unit. Rubber faced pallet arms protect materials being moved. Complete controls for lift, lower, tilt



and clamping are located at the drive end of the truck. In addition, the bumper is equipped with a foot button release allowing the operator to ride the truck and transport the load quickly over long distances. (Lewis-Shepard Products, Inc.)

For more data circle No. 53 on postcard, p. 125

Reclaims Coolant

Big savings in coolant and cutting oil costs are possible by reclaiming

To solve your toughest stripping problem

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS

Strip any type of paint fast... even epoxies ...with modern Oakite strippers

Even your toughest paint-removal problems can be solved with Oakite strippers. A dozen alkaline and solvent-type removers and additives are available to satisfy all needs. In the fastest, most economical way, they enable you to get a clean, smooth surface for repainting.

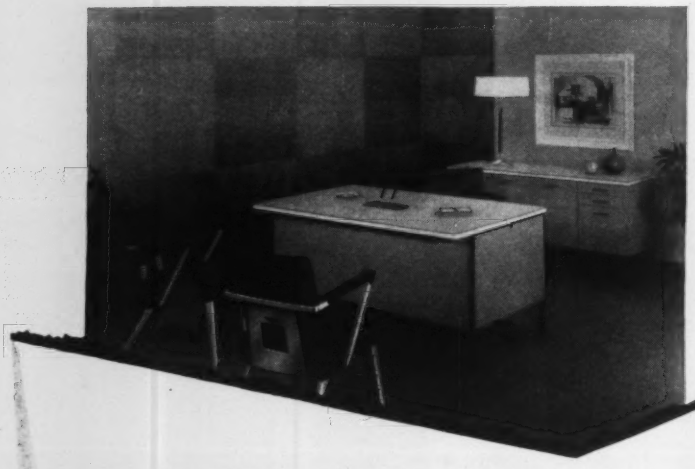
Oakite strippers are available to fit every method of application including soak tank... brush... steam gun. Look at these typical results:

- Stripping rejected television cabinets of paint and phosphate coating took 25 minutes before the proper Oakite material eliminated three steps, slashing time to 10 minutes.
- An auto parts maker says that a continuous cycle of 1 minute and 50 seconds "works like a charm stripping paint and incidental rust from rejects and hooks."
- Brass plated steel parts were stripped of their epoxy finish in a matter of minutes.

For stripper recommendation, just tell us your paint removal problem—the base metal, the paint type, number of paint layers, size of items to be stripped. Or ask your local Oakite man. Send for bulletin. Oakite Products, Inc., 26 Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

OAKITE
SCIENCE
over 50 Est. 1909 years' leadership in industrial cleaning



General Fireproofing depends on...

FEDERAL-WARCO

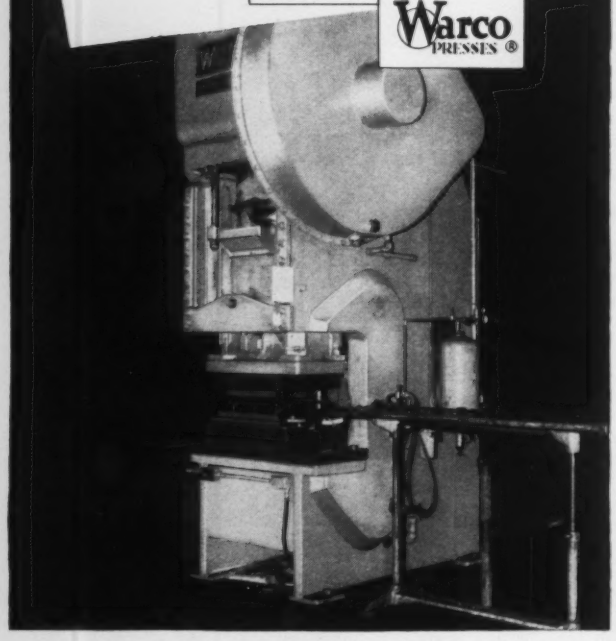
Warco presses and Federal welders operate as an integral part of General Fireproofing Company's production lines. They help General Fireproofing maintain its high quality standards and close tolerances, while meeting rigid production schedules.

The Warco press illustrated below, with related Federal-Warco equipment, helps General Fireproofing produce distinctive metal desks, filing cabinets, aluminum chairs, partitions and other products for the modern office.

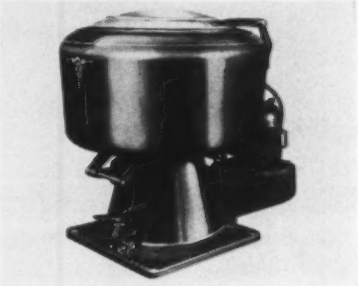
THE FEDERAL MACHINE AND WELDER COMPANY
Warren, Ohio

Federal WELDERS

Warco PRESSES



these liquids from metal chips, turnings, grindings and borings. A new chip wringer reclaims as much as 2.94 gal additional cutting oil from every 100 lb of metal chips. Outstanding features include: Easy, safe



operation; a sturdy sheet-iron basket, dynamically balanced; rugged Meehanite metal curb and base; special, heat-treated-steel, self-balancing spindle and an automatic spindle oiling device. (The American Laundry Machinery Co.)

For more data circle No. 54 on postcard, p. 125

Grinds Shapes

Profile grinders can also accurately grind and polish contours and irregular shapes. A new unit has its wheel mounted on a vertical reciprocating spindle. The grinding

wheel is in the center of a counterweighted 18-in. diam round work table. Reciprocating action of the grinding wheel promotes wheel life and prevents shoulders from forming on the wheel. (Star Cutter Co.)

For more data circle No. 55 on postcard, p. 125

Transistorized Gage

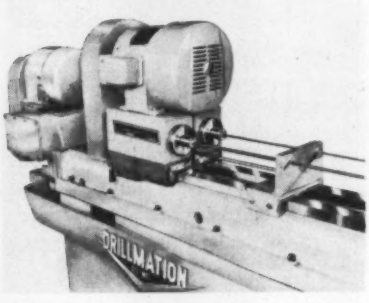
Where moving parts and floats cannot be used, for determining liquid levels, a fully-transistorized direct-reading unit can do the job. Bridge balancing is not required, nor

do changes in cable length affect the operation of the system. The unit handles relatively suspension-free liquids, ranging from the very low temperature cryogenics to highly corrosive acids at elevated temperatures. (Acoustica Assoc., Inc.)

For more data circle No. 56 on postcard, p. 125

Gun Drill

Dual spindles held Gun-drilling power units to slash production time in half on certain operations. Work-



pieces that will lend themselves to close center fixturing are ideal for this type of set-up. Finished holes can be drilled from solid materials —in one pass—on a production basis. Diameter to length ratios as high as 288:1 are possible with a

WYCKOFF

COLD FINISHED STEELS

Carbon • Alloy • Leaded

will definitely help you to make 1961 a banner year by reducing your costs through increased machinability, longer tool life, greater product dependability.

During the coming year all manufacturers will be striving in every way to make their operations more profitable.

For many users of cold finished steels Wyckoff technical assistance has made possible substantial savings in both time and money.

Take advantage of this service now — we will welcome the opportunity of cooperating with you, any time, anywhere!

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GENERAL OFFICES: **GATEWAY CENTER, PITTSBURGH 30, PA.**
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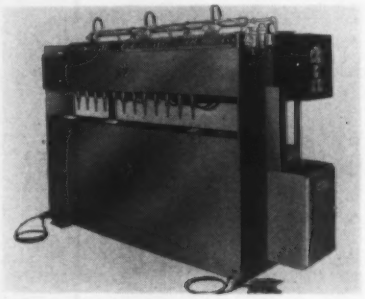
WYCKOFF STEEL PRODUCTS • Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12¾" x 2¼" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels

minimum runout of .0003 per inch. The unit is made and is available with hydraulic or positive drive mechanical transmission on the 12 and 24 in. strokes. A mechanical transmission is mandatory for the longer 36, 48 and 60 inch units. Feed rates can be coordinated to operate with spindle speeds up to 10,000 rpm. (Drillmation Co., Inc.)

For more data circle No. 57 on postcard, p. 125

Multihead Welder

Made as a standard unit with 4, 8, or 12 heads, the new multihead welder features cascade firing to prevent high power demand. All the heads come down at once; the transformers fire one after the other. Each head has its own cylinder and can be adjusted individually. Each head also has its own shut-off valve. All transformers have a timer and on-off switch. This allows for use of all or any combination of heads. Additional features include: Squeeze and hold timer and two-stage foot



switch arrangement. Simple adjustments reduce set-up time to a minimum. (Alphil Spot Welder Mfg. Corp.)

For more data circle No. 58 on postcard, p. 125

Swing Lathe

A 14 in. swing lathe, features a variable speed drive of 40-1400 rpm. This provides instant speed adjustment without shifting the drive belt. Other features include 14⅝-in. swing over beds, 9 in. swing over saddle cross, and two

precision ground V-ways and flat ways. The unit's hardened, ground steel spindle has a 1⅜ in hole and a draw-in collet capacity of 1 1/16 in. The spindle turns on four scaled and shielded precision ball bearings. The lathe bed is braced by oversize ribs to withstand heavy stresses. (Logan Engineering Co.)

For more data circle No. 59 on postcard, p. 125

Test Thin Sheet Metal

Designed for foil and thin-sheet work, a ductility testing machine permits quick, accurate readings for both experimental and production

WASHERS with old world craftsmanship manufactured by modern methods

Even in products regarded as "ordinary," like washers, there are differences. Differences that can cause trouble or create lasting satisfaction, as the case may be. *Milwaukee Wrot Washers* are better. Let us tell you why:

Washers and stampings have been our sole business for almost 75 years. We are the world's largest producer of washers . . . in the industry's most efficient plant . . . located in Milwaukee, the "Workshop of America" . . . with continuous family ownership and management, and highly skilled workers.

Metalworking Industry users of washers . . . ferrous, non-ferrous, stainless steel, plastic and fibrous materials . . . are invited to call on us for their needs. Orders and quotations will receive efficient and prompt attention.

PURCHASING PERSONNEL . . . Free samples available. Request on your letterhead, mentioning types of washers your company uses most frequently. Or write for Washers and Stampings Catalog 40-B.

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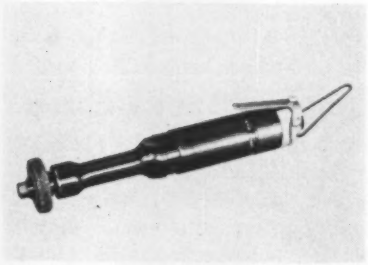
WORLD'S LARGEST PRODUCER OF WASHERS

work. Gripping pressure and movement of test piston of the machine may be adjusted to different levels independently of each other. The new testing machine comes in five gage calibrations. They range from 200-2000 lb, for work ranging from 0.002- to 0.020-in. maximum thickness. (Detroit Testing Machine Co.)

For more data circle No. 60 on postcard, p. 125

Small Wheel Grinders

Long-type small wheel pneumatic grinders dig into deep recesses. The units can also be used for two-hand operations. The arbor or spindle, driven by the powerful motor, is independently mounted on two



widely-spaced bearings, maintaining accurate alignment and permitting continuous heavy - duty small wheel grinding. The grinders are made with speeds from 12,000 to 25,000 rpm. A choice of lever, pushbutton, and ring throttle models is available. (Thomas C. Wilson, Inc.)

For more data circle No. 61 on postcard, p. 125

Thermobalance

Completely automatic, a recording thermobalance performs thermogravimetric studies in vacuum or controlled atmospheres at temperatures to 1000°C. The unit measures and automatically records changes in weight as a function of temperature programmed for a selected linear heating rate, or as a function of time at a constant temperature. (American Instrument Co., Inc.)

For more data circle No. 62 on postcard, p. 125

Power Controller

Electro-thermally-actuated, a stepless power input controller can be used to control flask heaters, mantles, heating tapes, water baths, small furnaces and other equipment. This compact instrument is truly stepless. The user can set any percentage of time on, from 5 to 100 pct. A neon pilot light turns on and off as the power is cycled. This unit automatically compensates for wide variations in voltage and ambient temperature. The corrosion-resistant stainless steel case incorporates a fuse to protect connected equipment and a female receptacle that accepts either a two- or three- prong plug. The circuit is rated at 115 v ac, 1500 w. (Thermo Electric Co.)

For more data circle No. 63 on postcard, p. 125

Indicator Crayons

Temperature - indicating crayons and paints can be used in any industrial or commercial application where temperature, and its correct determination, are factors. These easy-to-use temperature - measuring

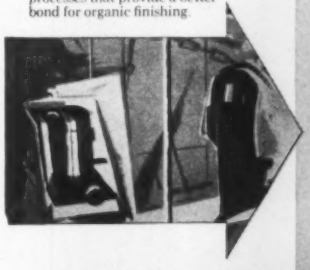
Here's the
PHOSPHATE COATING
You asked **TURCO TO MAKE**

HERE'S HOW **PAINTITE®** SCORES ON SURVEY'S 12 "MOST WANTED" FEATURES...

–Formulated as Result of Industry-Wide Survey...

During the first six months of 1959, Turco undertook an extensive survey of the phosphate coating market. Hundreds of users of these coatings were interviewed. Thousands of questions were asked. When the answers were tabulated, Turco began the task of building an iron phosphate process to the *exact specifications* called out in the survey.

The new process is now available. It is called Turco Paintite. Paintite has been thoroughly field-tested in the production lines of a dozen Turco customers. It has passed the most severe tests with flying colors. Turco is proud to announce the addition of Paintite to its ten other Turcoat phosphate and conversion coating processes that provide a better bond for organic finishing.



1. **SUPERIOR CLEANING**–Exclusive wetting system provides heavy-duty uniform cleaning. Cleans & phosphates simultaneously.
2. **TEMPERATURE VERSATILITY** – Efficient anywhere within range of 140° to 180°F. Temperature control is not important.
3. **LOW FOAMING** – at any temperature within recommended range.
4. **LESS POST RUST**–Eliminates post rusting problem often encountered with iron phosphate processes.
5. **NO WHITE STREAKING**–Extra free rinsing. Leaves no residue.
6. **ECONOMICAL**–Low in initial cost. Low in maintenance cost. Low in cost per sq. ft. Long-lived, even under mass production use.
7. **UNIFORM COATING**–even on edges and points. Won't show through on low-pigmented paints.
8. **USE VERSATILITY**–used by immersion, spray washer or steam cleaner.
9. **LESS SLUDGE** – less scale. Minimizes clean-up problems.
10. **RESERVE ACIDITY**–combats alkaline water conditions. Constant control not necessary.
11. **SUPERIOR SERVICE**–by Turco's vast network of technically trained servicemen, located in industrial centers throughout the world.
12. **REQUIRES ONLY 3 STAGES**–for dip or spray washing. Can be efficiently used in 5-stage operations, if desired.

FREE! VALUABLE BOOKLET PHOSPHATING REFERENCE CHART TECHNICAL DATA BULLETIN

Get the full story on Paintite and the other ten phosphating and conversion coating processes in the complete Turcoat line. Write for your copy, along with Turco's Phosphating Reference Chart, today!

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Chemical Processing Compounds
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FACTORIES: Rockdale, Ill., Houston, Wilmington, London, Rotterdam, Sydney, Mexico City, Paris, Hamburg, Montreal, Manila, Naha (Okinawa)
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MERELY AFFIX COUPON TO COMPANY LETTERHEAD
Please send valuable booklet with Phosphating Reference Chart and full details on Paintite. I understand there is no cost or obligation on my part.
NAME
TITLE IA

devices accurately indicate the temperature of any hot surface by distinct changes in color. The changes are not slight alterations in the shade of the original color, but an easily discernible change to a different color. (Air Reduction Sales Co.)

For more data circle No. 64 on postcard, p. 125

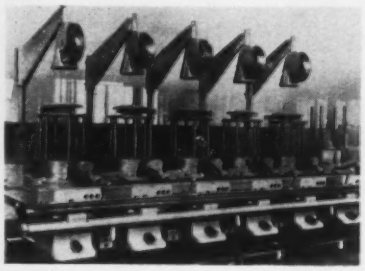
Force Gages

Precision mechanical force gages measure tension in a permanent test set-up. The force indicator's free-floating transmission rod, which transmits the tension load to a dial indicator, is threaded at its end for mounting in test apparatus or fixtures. The force gages are available in capacities of 20, 50, 75, 100, 150, 200, and 500 lb. The force-gage series is ruggedly constructed and housed in a cold-rolled steel case with a black wrinkle finish. Internal construction features a fully-compensated spring mechanism and a precise dial indicator. (Hunter Spring Co., a Div. of American Machine & Metals, Inc.)

For more data circle No. 65 on postcard, p. 125

Wire Drawing Machine

Arranged with independent motor drives, a line of multiple wire



drawing machines is suitable for low-torsion and non-twist drawing of wire. The individual motors are mounted below or behind each block. Each vertical capstan can be independently driven. Automatic controls set the unit into operation. The machine incorporates rapid stopping features in case of wire breakage or accidents. (Straus-Artys Corp.)

For more data circle No. 66 on postcard, p. 125

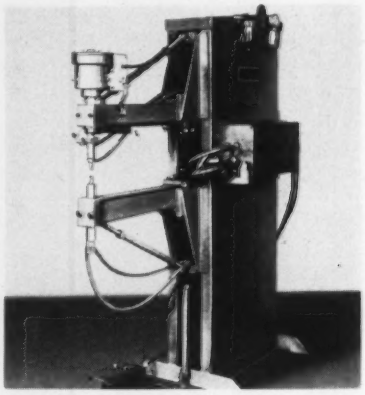
Six-in-One Welding Gun

A sextet of operations is possible with this electric arc gun. It serves as a spot welder, stud welder, tack welder, button welder, hole burner and riveter. Complete arc penetration may produce a hole, or a rivet as desired. A partial arc penetration may produce a stud, spot, tack or button weld as required. No back-up electrode or welder's helmet is needed to operate the gun. The gun works with any ac or dc welding power supply. (Beeco Mfg. Corp.)

For more data circle No. 67 on postcard, p. 125

Compact Spot Welder

Operating on regular 80 PSI line pressure, a new compact develops a clamping force of 1,950 lb. The unit has complete lubricator, strainer, and pressure regulator system.



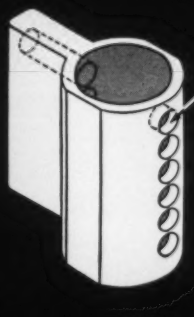
A standard foot switch controls the unit. The air valve is integrally mounted with the husky 5 in. double-acting cylinder for maximum efficiency. A unique feature of this machine is the sealed tubular construction of the upper arm, which provides a close-coupled surge tank, enabling fast recovery of the air cylinder for consistent, rapid stroke action. Work thicknesses range from 22 gage to ⅛ in. Throat depth adjusts from 12-36 in. (Vicking Products Co.)

For more data circle No. 68 on postcard, p. 125

BRASS CYLINDER LOCK CASE
620 PARTS PER HOUR GROSS

FIRST CHUCKING

(ON PLUG — CLAMP DOWN)

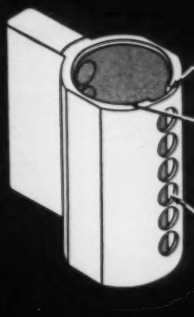


DRILL 6 PIN HOLES 1 INCH DEEP

LOCATE TO ±.001 WITH BUSHINGS IN PLUG

SECOND CHUCKING

(IN NEST — NO CLAMPING)



G BROACH SLOT

H COMBINATION BURR REAM & FACE

J DEBURR 6 PIN HOLES

Kingsbury machine cuts handling, makes big savings on Dexter locks

"Too much handling of lock parts causes nicking and burring. Then the assembled locks bind and we have to rework them," says Dexter Industries, Inc., of Grand Rapids, Michigan.

"Our new Kingsbury has cut our handling way down, eliminating nicks and increasing production by combining several operations in two chuckings of the work. We're delighted with it."

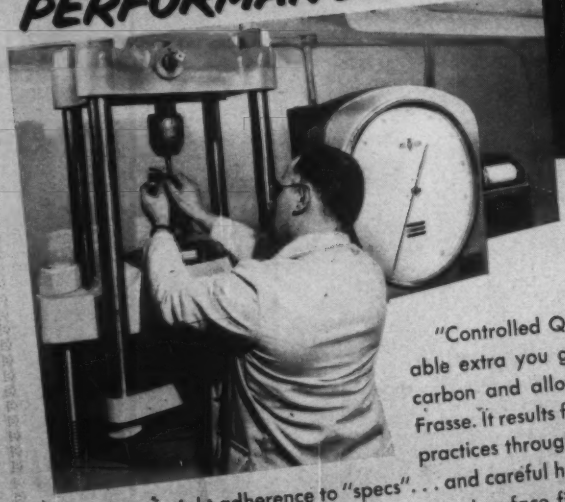
Each part passes twice around the machine. In the first chucking horizontal units at six stations drill the six pin holes, locating within .001. In the second chucking vertical units operate a broach and a combination tool. The last operation deburrs the pin holes; an air cylinder pushes removable pins on a block into the six pin holes.

Typical of what we can do for you. This setup resulted from the joint efforts of our sales engineers and representatives with Dexter's engineers and production men.

If you have drilling type operations in high production, may we make a proposal? Your Kingsbury will have good basic design and accurate rugged construction. It will be ready to produce when you receive it and will keep on producing. Kingsbury Machine Tool Corp., Keene, N. H.

KINGSBURY MULTI-UNIT AUTOMATICS

PREDICT PERFORMANCE with ... FRASSE "CONTROLLED QUALITY" STEEL BARS



"Controlled Quality" is the valuable extra you get in every bar of carbon and alloy steel shipped by Frasse. It results from rigid inspection practices through every step of production . . . tight adherence to "specs" . . . and careful handling, storing and shipping methods to protect straightness and surface finish.

The advantages of Frasse "Controlled Quality" are yours—in uniform results from bar to bar . . . shipment after shipment. It assures predictable performance from the steel you use . . . before you use it. You get exactly what you pay for, every time.

Since 1816—when Frasse first began serving steel users, its reputation for product reliability has been unsurpassed. That's why Frasse is a leading source for carbon bars and shafting—as well as commercial and aircraft quality alloy steels.

Frasse stocks an unusually complete range of sizes and grades—quick deliveries are routine. If you insist on top quality—want it fast . . . make it a point to call Frasse. Thousands of leading firms do . . . to their complete satisfaction.

Call FRASSE 1st for

Carbon and Alloy Steels

Frasse Stocks Include:

C1018	C1141	E4130
C1045	C1212	4130 H.T.
B1112	C1213	4140
B1113	Ledloy	4142
B1113X	4615	4142 H.T.
C1117	8620	E4340
C1137	E9310	E8740

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Auto Layoffs Dim Steel Outlook

Bad selling weather and large stocks of unsold cars are causing heavy automotive layoffs.

Without support from the auto industry, sustained improvement in steel operations is doubtful.

■ It's unlikely that the steel market will show any sustained improvement without a pickup in automotive steel orders. And at this time, this needed stimulant looks doubtful.

Current layoffs among major automakers, disappointing orders for automotive steel for this time of the year, creeping inventories of new cars, and general business pessimism are all prominent in the disappointing automotive outlook.

Added to the gloomy picture in Detroit is the seige of below normal temperatures and abnormal snowfall throughout much of the industrial East and Midwest. The weather has cut into sales of durable goods, particularly cars and major appliances, and slowed construction projects.

Bogged in Snow — The severe weather is having a much greater effect on overall business than is generally believed. Because of the bad weather, steel operations this week will be well below normal, even considering the low rate of new orders.

Outside of disappointing automotive steel orders, business continues to show some improvement. The end of inventory liquidation is helping bring new orders up to the rate of steel consumption. However, there is little evidence of inventory buildup and some steel users are still trying to cut stocks to the minimum.

Detroit Sentiment — Here are some reports from Detroit to show automotive steel sentiment:

March may be the low shipment month to automakers this year, on the basis of current orders.

One company, deep in automotive business, reports February is shaping up about the same as December. This means it will reflect a moderate decline from January.

Automakers and auto parts suppliers are leaders in trying to obtain price concessions. But the industry is still holding the line and there is no sign now of a break in the price front.

Auto Output Falls—In January, car production hit 414,000, compared with 688,000 for the month in 1960. Even so, the month's production added some 34,000 cars to inventories, bringing new car stocks over the one million mark again. Original plans called for 430,000 cars to be produced in February, but output could well drop below 400,000 on the basis of current business.

Orders for March shipments should be in by now, but they are coming in slowly. On the basis of new orders, the best that can be said is the market is no weaker this week.

Some Gains—Some general improvement is noted in tinplate, galvanized, oil country goods, bars from general users, and, in some localities, warehouse buying has picked up. Appliance makers and some farm implement makers have also stepped up their steel buying. The pattern is not general, however, and some individual companies in these fields have shown no greater interest in steel buying than a month ago.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	81	77	70	144
Buffalo	71	73	59	142
Pittsburgh	69	69	62	146
Youngstown	80	76	58	157
Cleveland	75	73	77	167
Detroit	93	99	99	120
Chicago	86	84	85	144
Cincinnati	86	88	76	147
St. Louis	86	80	63	123
Southern	78	80	77	137
Western	93	84	85	138
U. S. Index	80.1	78.7	73.1	144.0

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,492	1,466	7,300	13,569
Ingot Index				
(1957-59=100)	80.1	78.7	78.4	145.7
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel, base (cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$32.50	$31.83	$31.17	$40.58
No. 2 bundles	$22.83	$22.50	$21.50	$26.50

Adhesive Education Needed

There are elements in the adhesives industry that feel the time has come to inform and educate users.

Research may also mean additional markets.

■ One question was asked more than any other of industrial adhesive exhibitors during January's Society of Automotive Engineers convention in Detroit. It was: Are adhesives really strong enough to do the job?

Those doing the asking were mostly auto men, sometimes skeptical that a certain adhesive could do a certain gluing or coating job.

"There's no doubt our industry's got a big educational program ahead of itself in order to develop potential customers," said a representative of a large adhesive producing company.

For Right Job—Others share his opinion. That's why today many companies are furnishing advisors and information to prospective users, to make sure they use the right adhesive for the right job.

Naturally, auto interest at the SAE show was high. But interest is developing rapidly in other industries, particularly the appliance and home building trades.

A major use of synthetic resins is for coatings. In this category, epoxides, vinyls, polyurethanes and polyethylene are tabbed as annual volume gainers. Best prospects for epoxies are said to lie in electronics, building and highway uses; vinyls in automotive, electronic, appliance and building; polyurethane in coating wooden, metal and concrete surfaces; polyethylene for packaging.

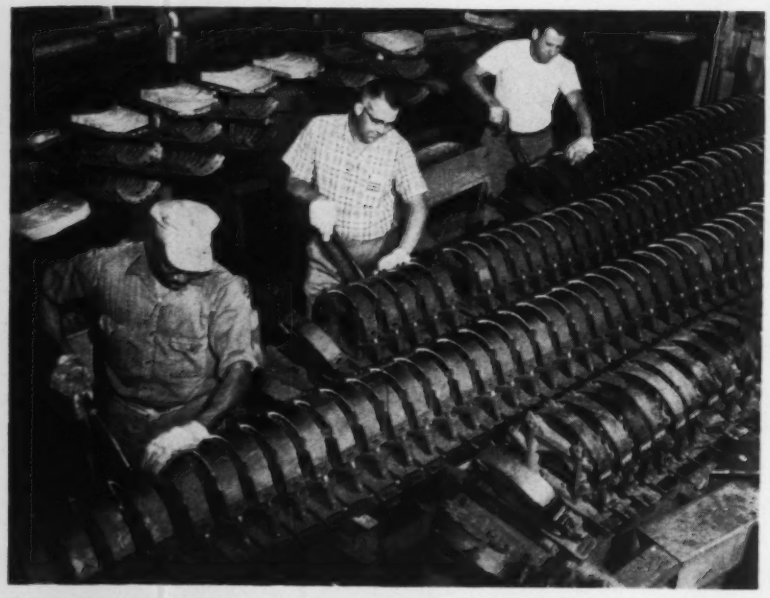
Water Resistant—In packaging, new and improved water-resistant adhesives are helping push up the market of multiwall bags. Reports are an increasing number of multiwall bag makers are changing from regular to new water-resistant adhesives as demand for water-resistant sacks rises.

In areas possibly more pertinent to metalworking, The American Assn. of Railroads' Chicago research center is working with a new epoxy resin glue for bonding steel rails to concrete crossties. There's belief that one day a new blue might replace expensive tie plates and other devices used as ties.

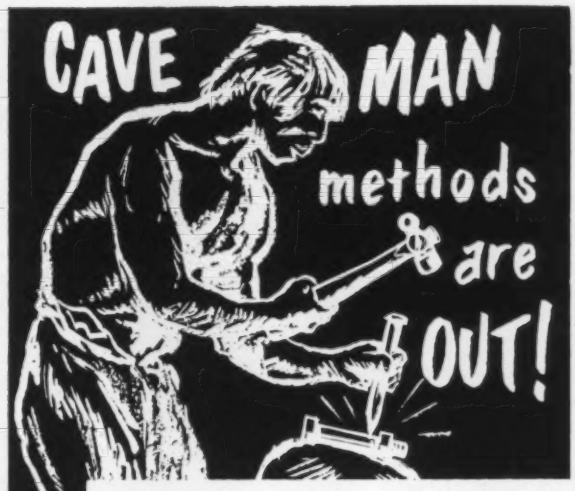
Also, there's another research area affecting the container business that might soon pay off, according to adhesives producers. This is bonding of tin can tops, bottoms and side seams. Other metalworking phases that adhesive researchers are working on are adhesives for replacing steel piping threads, and others designed to do away with nails.

Stable Prices — Adhesive prices are reported as very stable during the past six months. Suppliers indicate they'll stay that way for at least another six months, maybe more depending on general business conditions. However, one company recently increased by 1.5 cents a lb the cost of a type of powdered resin used in foundry and abrasive industries.

Availability of adhesives is no problem today. Customer inventories may be a little lower than normal. But they seem to be in the process of building up a bit.



SHOE-IN: Workmen at Chrysler Corp., Detroit, place brake shoes and linings into clamps on a sliding conveyor line which carries them into an oven where they're baked onto the metal. Research by the adhesive industry may produce new products for such an operation.



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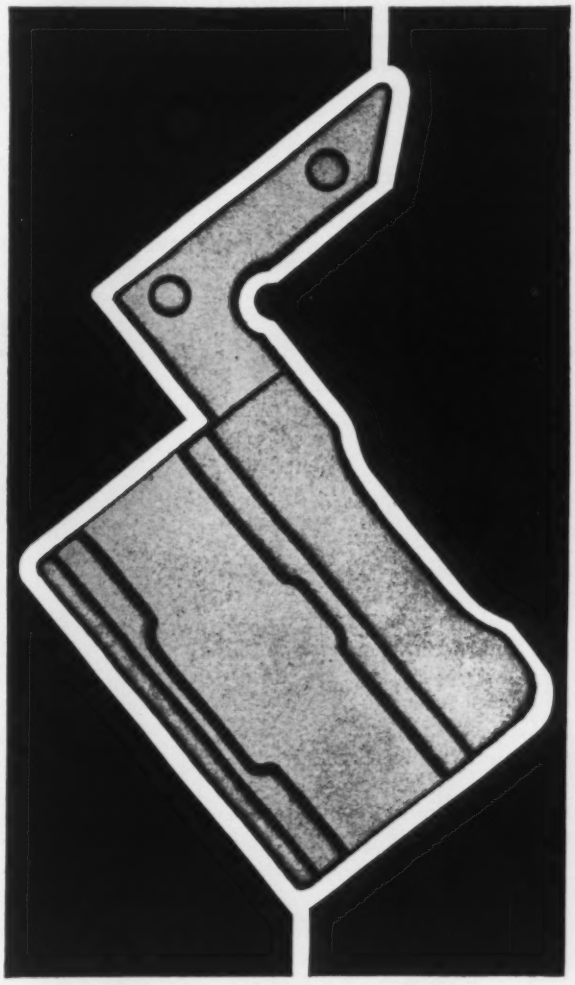

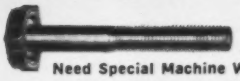

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Negative Factors Outweigh Plus

The minus side of the market is still more than enough to counter-balance any improvements.

It becomes more and more evident that steel operations are tied directly to automobiles.

■ The steel market lacks stamina.

A mild pickup in steel buying by general users a few weeks ago carried with it the hopes for an upturn in overall steel operations. But improvements in non-automotive segments of metalworking haven't been enough to overcome the growing number of setbacks and cancellations from the auto market.

The appliance industry hasn't come in strong enough to hold up the sheet market. Except in the Midwest, structural mills are just limping along, with few prospects for any significant improvement until spring.

Less Than Good—Plate users are beginning to show some interest in the market, but mills are getting stiff competition from price-cutting warehouses. Wire users are still ordering on a hand-to-mouth basis. The bar market, generally, is following automotive sheet buying.

Galvanized, tinplate and electrical sheets are beginning to show some strength. But the pickup in oil country goods orders has begun to ease once again.

All in all, negative factors still outweigh the positive side.

Sheet and Strip—Sheet mills are scrambling to find miscellaneous orders to offset auto cutbacks. As a **Pittsburgh** mill explains it, it may take 30 small orders to balance one automotive cancellation. Customers along the **East Coast** say they are being contacted by sheet mills in the **Midwest** quoting prices substantially under local prices. This is despite the added freight. This could be another example of customers trying to scare price concessions out of area mills, however. Some big cancellations are beginning to come into sales offices in **Detroit** from large automotive suppliers. Chrysler's suppliers account for the most, but suppliers to other automakers are being heard from with increasing frequency. The only optimistic reports seem to be coming from **Chicago.** Some mills in the district say they have received April orders. This is some of the longest buying since last March.

Pipe and Tubing—Orders for oil country seamless have started to lag at one mill in the **Pittsburgh** area after relatively good months in January and December. An unusually sharp seasonal drop in drilling rates may be behind this. Drilling dropped off by 300 rigs in recent weeks. It's now at a 14-year low. Mills hope this is only temporary.

Stainless—Automotive strip mills are feeling the pinch of cutbacks in **Detroit.** To make matters worse, auto plants have gotten away from advance releases. The outlook for this month is not too good. However, demand for non-automotive stainless picked up a little in January. This affects **Pittsburgh** mills particularly. Fairly large tonnages of stainless plate went for building tanks for liquid oxygen and hydrogen.

Plates and Shapes — Structural mills in the Midwest continue to run at a fairly steady pace of about 15 turns. Plate mills are beginning to show some improvement. Some **Chicago** mills get up to about 15 turns one week, but drop slightly the next. Surprisingly, this is in the face of top-heavy plate inventories in warehouses—where prices are soft. **East Coast** reports are a little more mixed. But they range from status quo to a slight improvement noted by at least one mill.

Bars—January was one of the better months out of the past six or so, but it's still too early to tell about February. For the most part, **Pittsburgh** producers don't see any decisive change in the timing or volume of business. An **East Coast** mill says that hot-rolled bars look pretty good—so far. This is partly due to increased buying by cold-finishing mills. But any improvement is relative. A **Midwest** mill says its January orders were better than December, but still only 50 pct of the average for the first six months of last year. Another bar specialist says in **Detroit** that it has little hope of improvement this month. Hot-rolled bar producers in **Chicago** are still running very short cycles, but bookings are advancing. A few mills have booked orders for late March and early April.

Wire—Orders for manufacturers wire continue at a low level and on a hand-to-mouth basis. Most shipments are made out of finished stock. The same is true for construction products. The only optimism, say **Pittsburgh** mills, is in the fact that the demand for rush service indicates low inventories.

PURCHASING AGENT'S CHECKLIST

Severe winter weather slows down sales, snarls shipments and deliveries. P. 77

Aluminum and steel continue battle for can markets. P. 81

What are the prospects for price controls? P. 84

COMPARISON OF PRICES

(Effective Feb. 6, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Feb. 6 1961	Jan. 30 1961	Jan. 9 1961	Feb. 9 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slags, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Feb. 6 1961	Jan. 30 1961	Jan. 9 1961	Feb. 9 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$31.50*	$30.50	$29.50	$42.50
No. 1 steel, Phila. area	35.50	35.50	34.50	40.50
No. 1 steel, Chicago	30.50*	29.50	29.50	38.75
No. 1 bundles, Detroit	26.50	26.50	26.50	39.50
Low phos., Youngstown	34.50	34.50	34.50	46.50
No. 1 mach'y cast, Pittsburgh	44.50	44.50	44.50	55.50
No. 1 mach'y cast, Phila.	48.50	48.50	47.50	54.50
No. 1 mach'y cast, Chicago	46.50*	45.50	44.50	59.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$32.50*	$31.83	$31.17	$40.58
No. 2 bundles	22.83*	22.50	21.50	26.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75.15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	29.00	29.00	30.00	33.00
Copper, Lake, Conn.	29.00	29.00	30.00	33.00
Tin, Straits, N. Y.	100.50†	100.50	100.50	100.875
Zinc, East St. Louis	11.50	11.50	....	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

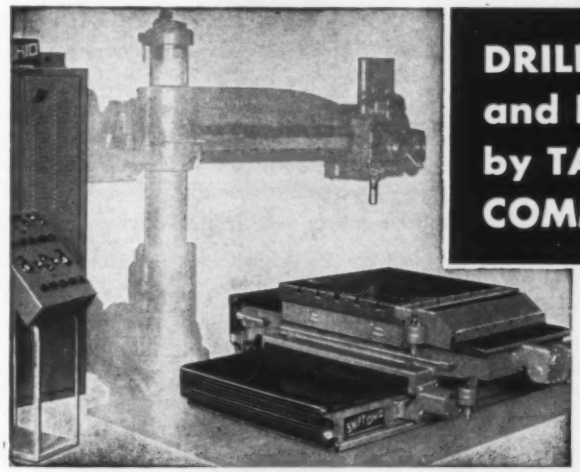
Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

INDEX TO PRICE PAGES

Prices At a Glance 149
Comparison of Prices 153
Bars 160
Billets, Blooms and Slabs 158
Boiler Tubes 164
Clad Steel 164
Coke 163
Electrical Sheets 164
Electrodes 164
Electroplating Supplies 164
Fasteners 162
Ferroalloys*
Iron Ore 162
Merchant Wire Products 162
Metal Powders 164
Nonferrous
Mill Products 157
Primary Prices 153-156-157
Remelted Metals 157
Scrap 157
Piling 158
Pig Iron 162
Pipe and Tubing 163
Plates 160
Rails 164
Refractories 164
Service Center Prices 161
Shapes 158
Sheets 159
Spring Steel 164
Stainless 162
Steel Scrap 155
Strip 158
Structurals 158
Tinplate 159
Tool Steel 162
Track Supplies 164
Water Pipe Index 163
Wire 160
Wire Rod 159

*Appears in the Feb. 2-Feb. 16 issues.



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Export Is Still The Big Factor

Domestic prices in some areas have inched up, but export demand is still the big market factor.

Enough domestic interest could result in a runaway market.

■ Domestic prices moved slightly upward in some areas this week, but export strength is still the big market factor. In fact, most of the recent market strength can be traced to strong export demand.

Last year, exports of scrap totaled about 6 million tons. This year, the Japanese alone want approximately 4 million tons of U. S. scrap. Reports say this tonnage is to be lined up early this year.

If major domestic mills come into the market for any large tonnage, this could result in a runaway—despite the depressed state of the steel market.

For one thing, there are no large accumulations in scrap yards across the nation. Many dealers have put trucks, cranes and other facilities to use in other businesses and scrap collections are low.

Another contributing factor: The bad weather in many parts of the nation has brought scrap collections to a virtual halt.

The IRON AGE composite prices for No. 1 heavy melting scrap and No. 2 bundles are up slightly this week because of price rises in Pittsburgh and Chicago.

Pittsburgh — Prices of dealer openhearth grades moved up another $1 this week as a mill on the fringe of the district paid $32 for No. 1 heavy melting. The new price is $2 over the amount paid last month by the same mill and $5 higher than the lower of December. Gains have come with little or no increase in local buying. The market remains very quiet. But with bad weather and active demand in other districts, more money is needed to maintain the small local flow. A really heavy scrap movement would require sharp price increases.

Chicago—Reinforced by a scramble for export scrap, the market again advanced this week. The first upward move came when a major auto list advanced $1 and other lists have been snapped up at advancing prices. Mills have refused to buy at present prices, and yards are holding on to scrap. Mill offers at $32 for industrial scrap, aimed at pegging the market, have had little effect in holding the advance.

Philadelphia — The market has become confused with fair export demand, a slight increase in domestic interest, but activities hampered by inclement weather. However, most scrapmen in the area believe prices may be poised for an upward move.

New York—The record snowfall that hit late last week has tied up the port. At the beginning of the week, no scrap was moving. And it looked like this would be the market status through the week. But everyone is in the same situation and there is no price pressure.

Detroit—Except for export activity, this is a quiet market. There's no domestic interest whatsoever. Great Lakes Steel Corp. has only six furnaces operating; Ford Motor Co. is operating eight openhearths. Great Lakes bought No. 2 bundles off the February industrial list and held the price, but tonnage was only half that of January. The dealer market for No. 2 grades is depressed. Export has resulted, however, in some firmness for No. 1 grades.

Cleveland — Dealers are having to pay higher prices for incoming scrap, but mills are still interested only in limited amounts at quoted levels. So the market will apparently remain at a standstill for awhile. Any large demand would raise prices, but it's not in sight yet.

Cincinnati—Area mills are paying $2 more than a month ago in the face of out-of-area demand. No. 2 bundles are still more welcome upriver than in this immediate area. Foundry activity is still slow.

St. Louis—A little better demand has been shown in the area. One mill has improved its operating rate and is pushing a little harder for scrap. However, there is still some resistance to higher prices.

Birmingham — Scrap movement continues slow. But a Birmingham electric furnace lifted its embargo and announced it would buy about half its customary order this month.

Buffalo — All prices are unchanged and the market is at a standstill. There is no change in sight.

Boston—The better tone of the market continues. However, snow and freezing temperatures hampered operations this week.

West Coast — Some dealers say major mills are putting out feelers to test the quoted prices. The flow of scrap in the area is slow. Exporters are reported to be paying above the quoted prices.

Houston—The domestic market continues dull although plate and structural price has increased. Only little of that item is generated and purchases are made in remote areas.

SCRAP PRICES *(Effective February 6, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	32.00 to 33.00
No. 1 factory bundles	38.00 to 39.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Low phos. punch'gs plate	37.00 to 38.00
Heavy turnings	27.00 to 28.00
No. 1 RR hvy. melting	35.00 to 36.00
Scrap rails, random lgth	43.00 to 44.00
Rails, 2 ft and under	47.00 to 48.00
RR specialties	42.00 to 43.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	36.00 to 38.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Low phos. forge crops	40.00 to 41.00
Low phos. punch'gs plate, ¼ in. and heavier	37.00 to 38.00
Low phos. 2 ft. and under	35.00 to 36.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth	42.00 to 43.00
Rerolling rails	54.00 to 56.00
Rails 2 ft. and under	47.00 to 48.00
Angles and splice bars	41.00 to 42.00
RR steel car axles	56.00 to 57.00
RR couplers and knuckles	39.00 to 40.00
No. 1 machinery cast.	46.00 to 47.00
Cupola cast.	41.00 to 42.00
Cast iron wheel	32.00 to 33.00
Malleable	44.00 to 45.00
Stove plate	35.00 to 36.00
Steel car wheels	39.00 to 40.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	100.00 to 105.00
430 bundles and solids	90.00 to 95.00
430 turnings	55.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 dealer bundles	37.00 to 38.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	13.00 to 14.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast. chem. borings	25.00 to 26.00
Low phos. 5 ft and under	39.00 to 40.00
Low phos. 2 ft punch'gs	41.00 to 42.00
Elec. furnace bundles	38.00 to 39.00
Heavy turnings	25.00 to 26.00
RR specialties	41.00 to 42.00
Rails, 18 in. and under	50.00 to 52.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	38.00 to 39.00
Cast iron car wheels	39.00 to 40.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	48.00 to 49.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.50 to $27.50
No. 2 hvy. melting	24.50 to 25.50
No. 1 dealer bundles	27.50 to 28.50
No. 2 bundles	18.00 to 19.00
Machine shop turn.	10.00 to 11.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Low phos. 18 in. and under	36.00 to 37.00
Rails, random length	39.00 to 40.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast.	36.00 to 37.00
Heavy breakable cast.	29.00 to 30.00
Drop broken cast.	46.00 to 47.00

Youngstown

No. 1 hvy. melting	$32.50 to $33.50
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	32.50 to 33.50
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	34.00 to 35.00

Cleveland

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	29.00 to 30.00
No. 1 factory bundles	34.00 to 35.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft & under	35.00 to 36.00
Low phos. punch'gs plate	30.00 to 31.00
Drop forge flashings	29.00 to 30.00
Foundry steel, 2 ft. & under	31.00 to 32.00
No. 1 RR hvy. melting	32.00 to 33.00
Rails 2 ft. and under	45.00 to 46.00
Rails 18 in. and under	46.00 to 47.00
Steel axle turnings	23.00 to 24.00
Railroad cast.	45.00 to 46.00
No. 1 machinery cast.	45.00 to 46.00
Stove plate	39.00 to 40.00
Malleable	44.00 to 45.00
Stainless	
18-8 bundles	160.00 to 165.00
18-8 turnings	80.00 to 90.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 busheling	25.00 to 26.00
No. 1 dealer bundles	25.00 to 26.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	13.00 to 14.00
Low phos. plate	33.00 to 34.00
Structurals and plate, 2 ft. and under	35.00 to 36.00
Scrap rails, random lgth	34.00 to 35.00
Rails 2 ft. and under	44.00 to 45.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	36.00 to 37.00

St. Louis

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.00 to 26.00
Foundry steel, 2 ft.	28.00 to 29.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	18.00 to 19.00
No. 1 RR hvy. melting	32.00 to 33.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	41.00 to 42.00
RR specialties	39.00 to 40.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	35.00 to 36.00
Cast iron car wheels	33.00 to 34.00
Rerolling rails	49.00 to 50.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	34.00 to 35.00
Elec. furnace, 3 ft. & under	34.00 to 35.00
Bar crops and plate	38.00 to 39.00
Structural and plate, 2 ft.	37.00 to 38.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rail, random lgth	40.00 to 41.00
Rails, 18 in. and under	45.00 to 46.00
Angles and splice bars	36.00 to 37.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	35.00 to 36.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 thvy. melting	20.00 to 21.00
No. 2 dealer bundles	15.00 to 16.00
Machine shop turnings	2.50 to 3.00
Mixed bor. and turn.	3.00 to 4.00
Shoveling turnings	5.00 to 6.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.50 to $23.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	22.00 to 23.00
Drop forge flashings	22.00 to 23.00
Machine shop turn.	7.00 to 8.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Heavy breakable cast.	25.00 to 26.00
Mixed cupola cast.	30.00 to 31.00
Automotive cast.	36.00 to 37.00
Stainless	
18-8 bundles and solids	145.00 to 150.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$24.00 to $24.50
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	24.00 to 25.00
Machine shop turn.	2.50 to 3.50
Shoveling turnings	5.50 to 6.00
Clean cast. chem. borings	13.50 to 14.50
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	29.00 to 30.00
Heavy breakable cast.	26.50 to 27.50

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	14.00
No. 1 cupola cast.	46.00 to 48.00

Los Angeles

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	42.00
No. 1 cupola cast.	39.00 to 40.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$24.00
No. 2 hvy. melting cut 3 ft. and under	22.00
No. 1 dealer bundles	24.00
No. 2 bundles	16.00
Mixed steel scrap	16.00
Bush., new fact. prep'd	23.00
Bush., new fact. unprep'd	18.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	30.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	20.50
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft & under	$43.00 to 44.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

Will U. S. Lower Aluminum Tariff?

U. S. Tariff Commission has heard the arguments on a lower tariff for aluminum.

U. S. producers contend a lower tariff would hurt the domestic industry. At the least, it would create new pressures for lower prices.

■ Recent hearings by the U. S. Tariff Commission did little to clarify the problem of whether to recommend a lower primary aluminum tariff.

Those making statements to the Commission steered close to their own industry line. Producers opposed lowering tariffs; independent fabricators and Aluminium Ltd., the Canadian producer, favored lower tariffs, or no tariffs at all.

The Facts—There was no dispute on the major facts of the situation. But both sides drew different conclusions from the same facts.

Frank L. Magee, chairman of Aluminum Co. of America concluded, "In view of current idle capacity and unemployment, a still lower U. S. tariff on primary aluminum is not justified."

Idle Capacity — He pointed out that domestic producers invested about $2 billion from 1950 to 1960 to expand smelting capacity. He attributes this rise to "domestic producers' determined efforts to assure ample aluminum supplies."

Mr. Magee also noted that about 800,000 tons of domestic capacity, about 30 pct of the total, is now idle.

Richard S. Reynolds, president, Reynolds Metals Co., said, "Earnings and market development would not be improved by increasing the flow of foreign aluminum into United States markets . . . A further reduction of the already low tariff cannot serve any constructive purpose and can do serious injury."

On the Other Hand — On the other side, Eric West, president, Aluminium Limited Sales, Inc., the U. S. arm of the Canadian producer, made a strong case that the "existing duty is a wholly unnecessary burden and restriction on imports and should be reduced to the maximum extent permissible by law."

Mr. West readily concedes the growth of the domestic aluminum industry, but contends the U. S. producers have shared its fruits.

He points out that exports from the U. S. have zoomed, from 662 tons, worth $259,408, in 1950 to 225,350 tons, worth over $101.4 million in only the first three-quarters of 1960. And, he says the world aluminum price is 23¼¢ per lb, lower than the 26¢ per lb in the U. S.

Meeting the Price—This means, he says, "No possible doubt can exist of the ability of the domestic producers to meet competition from any source in the world on an aggressive, increasing, and profitable basis."

Milton J. Smoth, president, Trim Alloys Inc., Boston, an independent extruder, spoke for himself only, but voiced the sentiments of many independents. He favored lowering tariffs.

One of his points: "It seems quite unfair when a supplier, who is also an active competitor, is in a position to curtail the supply of raw material available to those of us who are not integrated, while he goes on taking all of the business that he can possibly handle."

The Possibility — If the tariff is knocked down, what would it mean?

Initially, for Aluminium it would simply improve its profit picture.

The Canadian producer now absorbs the tariff for U. S. buyers. And, generally, Aluminium has sold in the U. S. at the going U. S. price, so lower tariff would probably not prompt the company to undersell U. S. producers. But some price pressure would be inevitable.

Tin prices for the week: Jan. 31—100.375; Feb. 1—100.375; Feb. 2—100.375; Feb. 3—100.50; Feb. 6—100.50*.

*Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in JANUARY based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	29.43
Copper, Lake	29.43
Straits, Tin, New York	100.58
Zinc, E. St. Louis	11.50
Lead, St. Louis	10.80
Aluminum ingot	26.00

Note: Quotations are on going prices

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	29.00	30.00	1/16/61
Copper (CS)	29.00	30.00	1/11/61
Copper (L)	29.00	30.00	1/16/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/6/56
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 157.

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size*	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 3/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

◑	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	54.13	.....	51.36	55.32
Brass, Yellow	48.10	48.39	48.04	52.26
Brass, Low	50.65	50.94	50.59	54.71
Brass, Red	51.54	51.83	51.48	55.60
Brass, Naval	52.86	59.17	46.67	57.02
Muntz Metal	50.94	.....	46.25	.....
Comm. Bz.	52.98	53.27	52.92	56.79
Mang. Bz.	56.80	.....	50.20	.....
Phos. Bz. 5%	74.59	74.34	75.09	76.52

Free Cutting Brass Rod 33.71

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb)... $1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9% dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz.... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb..... 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz.. $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 27.25
- No. 120 ..... 26.25
- No. 123 ..... 25.25

80-10-10 ingot
- No. 305 ..... 31.75
- No. 315 ..... 29.50

88-10-2 ingot
- No. 210 ..... 39.50
- No. 215 ..... 36.25
- No. 245 ..... 31.50

Yellow ingot
- No. 405 ..... 22.75

Manganese bronze
- No. 421 ..... 26.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type).. 26.00-27.00
No. 12 alum. (No. 2 grade)... 22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)... 24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 23.75-24.75
Grade 2—92-95% 22.50-23.50
Grade 3—90-92% 21.50-22.50
Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	25	24¼
Yellow brass	19¼	17⅝
Red brass	22¼	21½
Comm. bronze	23	22¼
Mang. bronze	18⅛	17⅝
Free cutting rod ends.	18⅜	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 25
No. 2 copper wire 23
Light copper 20¾
*Refining brass 21¼
Copper bearing material 20½
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 24½
No. 2 copper wire 23
Light copper 20½
No. 1 composition 20
No. 1 comp. turnings 19
Hvy. yellow brass solids 15
Brass pipe 14
Radiators 16

Aluminum

Mixed old cast. ..... 12 —12½
Mixed new clips ..... 13¾—14¼
Mixed turnings, dry ..... 12¾—13¼

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 21½—22
No. 2 copper wire ..... 19½—20
Light copper ..... 17½—18
Auto radiators (unsweated).. 12¼—12¾
No. 1 composition ..... 16¼—16¾
No. 1 composition turnings... 15¼—15¾
Cocks and faucets ..... 12¾—13¼
Clean heavy yellow brass ... 12¼—12¾
Brass pipe ..... 13¼—13¾
New soft brass clippings .... 13¼—13¾
No. 1 brass rod turnings .... 13¼—13¾

Aluminum

Alum. pistons and struts .... 6½— 7
Aluminum crankcase ..... 8½— 9
1100 (Ss) aluminum clippings 11½—12
Old sheet and utensils ..... 8½— 9
Borings and turnings ..... 4½— 5
Industrial castings ..... 9 — 9½
2020 (24s) clippings ..... 10 —10½

Zinc

New zinc clippings ..... 5½— 5¾
Old zinc ..... 2¾— 3
Zinc routings ..... 1¾— 2
Old die cast scrap ..... 1 — 1¼

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 23-23.50
Clean Monel turnings 16.50-17
Old sheet Monel 22-23
Nickel silver clippings, mixed. 18
Nickel silver turnings, mixed. 15

Lead

Soft scrap lead ..... 7 — 7½
Battery plates (dry) ..... 3 — 3¼
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 73 —75
No. 1 pewter ..... 55 —56
Auto babbitt ..... 41 —42
Mixed common babbitt ..... 9 — 9½
Solder joints ..... 12½—13
Small foundry type ..... 8½— 9
Monotype ..... 8¾— 9¼
Lino. and stereotype ..... 8 — 8¼
Electrotype ..... 7½— 7¾
Hand picked type shells ..... 5¼— 5¾
Lino. and stereo. dross ..... 1¾— 2¼
Electro dross ..... 2 — 2½

(Effective Feb. 6, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Feb. 6, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* 1.25-lb. base box	Electro** 0.25-lb. base box	Thin 0.25 lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*				$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*				Holloware Enameling 29 ga.—7.85 *U1* at Gary; Pittsburgh: *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets. ** For 55 lb.; for 60 lb. add 15¢. †† 7.425 at Sharon; Niles is 7.225.

(Effective Feb. 6, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1, A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Feb. 6, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.,
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore	$.10	7.87	9.71	10.16	10.28	8.44	9.13	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	.....	.....
Boston	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.79	16.69	23.89	21.04
Buffalo	.15	8.70	9.45	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		10.90	12.53	13.27	13.07	10.74	11.24	10.88	12.97	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		10.17	10.98	11.35[3]	11.73	9.90	9.81	9.58	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	9.59	11.42	10.95	11.76	9.43	9.93	9.57	11.77	17.17	15.87	21.87	21.12
Los Angeles		9.50[1]	11.20	12.20	11.29	9.82	10.54	9.67	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.13	10.50	.....	10.79	8.81	9.16	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.24	20.49
New York	.10	9.77	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	8.95	10.10	10.99	10.45	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		9.45	11.30	12.35	11.45	9.60	10.05	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco	.10	10.27	11.79[2]	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.15
Spokane	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.75	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	8.94	9.84	10.99	11.16	8.83	9.33	8.97	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Feb. 6, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T1*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50-32.75	32.00	29.50-34.50	47.50	38.00	46.50	—	19.25-21.50	—	19.75-21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25-31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7,* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Feb. 6, 1961)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
	Col	Col	Col	Col	Col		
Alabama City *R3*	173	187	....	212	193	9.00	9.55
Aliquippa *J3****	173	190	....	....	190	9.00	9.675
Atlanta *A8***	173	191	....	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	....	214	199	9.10	9.85
Donora Pa. *A5*	173	187	....	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	....	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	....	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	....	219	203	9.10	9.775
Johnstown *B3***	173	190	177	....	196	9.00	9.675
Joliet Ill. *A5*	173	187	....	212	193	9.00	9.55
Kokomo *C9**	175	189	....	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	....	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	.....	236	9.95	10.50
SparrowsPt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

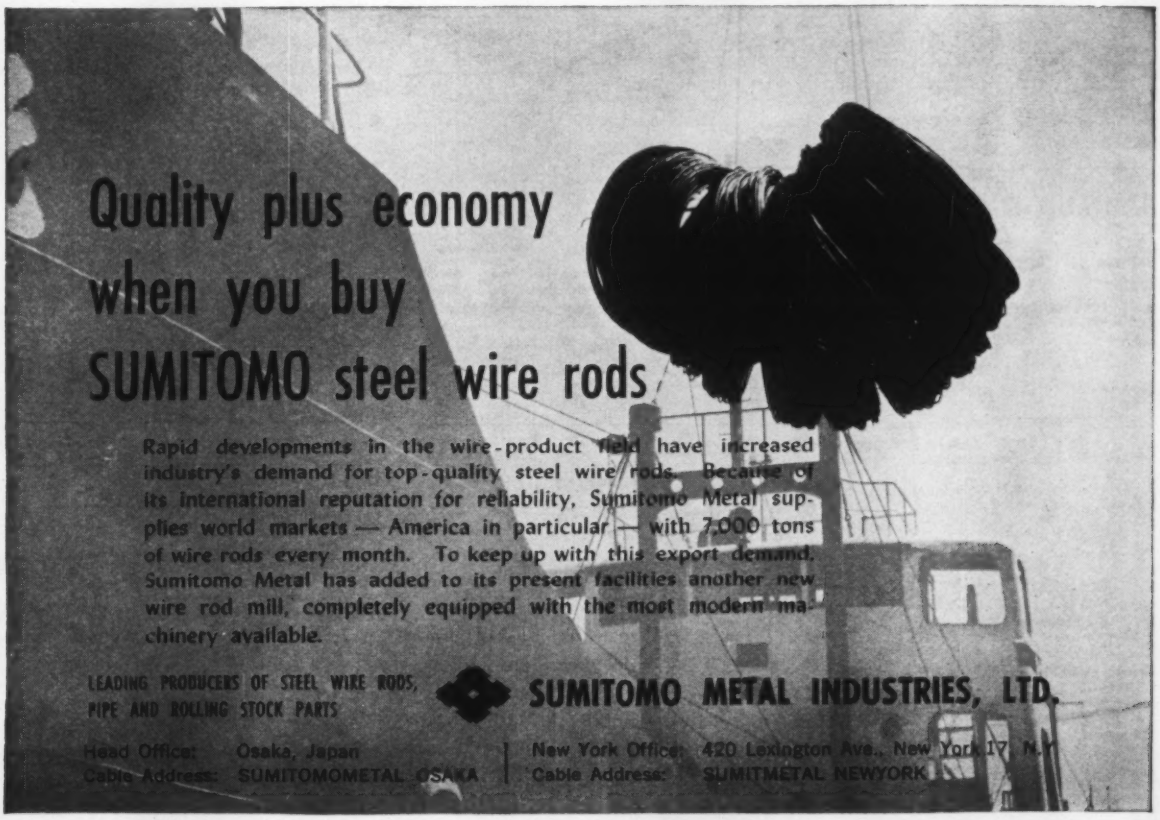
CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

›Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75


Quality plus economy
when you buy
SUMITOMO steel wire rods
Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods. Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.
LEADING PRODUCERS OF STEEL WIRE RODS, PIPE AND ROLLING STOCK PARTS
SUMITOMO METAL INDUSTRIES, LTD.
Head Office: Osaka, Japan
Cable Address: SUMITOMOMETAL OSAKA
New York Office: 420 Lexington Ave., New York 17, N.Y.
Cable Address: SUMITMETAL NEWYORK

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25			
Cleveland *R3*						15.35
So. Chicago *R3*				10.10		
Ensley *T2*	5.75	6.725				
Fairfield *T2*		6.725		10.10	6.875	
Gary *U1*	5.75				6.875	
Huntington, *C16*		6.725				
Ind. Harbor *I3*				10.10		
Johnstown *B3*		6.725				
Joliet *U1*			7.25			
Kansas City *S2*				10.10		15.35
Lackawanna *B3*	5.75	6.725	7.25		6.875	
Lebanon *B3*			7.25			15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*						15.35
Pittsburgh *J3*				10.10		
Seattle *B2*					6.75	15.85
Steelton *B3*	5.75		7.25		6.875	
Struthers *Y1*				10.10		
Torrance *C7*					6.75	
Williamsport *S5*		6.725				
Youngstown *R3*				10.10		

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	16.85
Bristol, Conn. *W12*		10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70		
Detroit *D1*	9.05	10.50	12.70	15.70	
Detroit *D2*	9.05	10.50	12.70		
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*			12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*		10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper

- Rolled elliptical, 18 in. or longer, 5000 lb lots 43.50
- Electrodeposited, 5000 lb lots ... 36.50
- OFHC anodes ..... 40.50 to 43.50 (depending on shape)

Brass, 80-20, ball anodes, 2000 lb or more 50.50

Zinc, ball anodes, 2000 lb lots 19.75
(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carbon, 5000 lb 1.0225
(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.50

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

- Copper cyanide, 100 lb drum, N. Y.. 65.90
- Copper sulphate, 25.2 Cu min, 6000 lbs per cwt, Detroit 17.45
- Nickel sulfate, 5000 lbs 29.00
- Nickel chloride, freight allowed, 100 lb 45.00
- Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums 24.00
- Zinc cyanide, 100 lb, N. Y. 60.75
- Potassium cyanide, 100 lb drum N. Y. 45.50
- Chromic acid, flake type, 10,000 lb or more, N. Y. 30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

- Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R. 11.50
- Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots 25.75
- Carbonyl Iron (200 lb lots) 88.00
- Welding Grades 8.10
- Cutting and Scarfing Grades 9.85
- Hydrogen reduced, domestic 11.25

Copper Powders

- Molding Grades
  - Electrolytic, domestic, f.o.b. shipping point. 15.00†
  - Atomized ..... 42.3 to 60.3
  - Reduced ..... 15.00†
  - Chemically Precipitated 43.5

Brass, 5000-lb lots ..... 32.3 to 48.9

Bronze, 5000-lb lots ..... 50.3 to 54.2

Chromium, electrolytic 5.00

Lead ..... 7.50†

Manganese, electrolytic ... $1.00

Molybdenum ..... $3.60 to $4.35

Nickel $1.15

Carbonyl Nickel, 20,000 lb lots $1.01

Nickel-Silver, 5000 lb lots.. 57.9 to 65.9

Silicon 70.00

Solder ..... 7.00†

Stainless Steel, 316 ..... $1.07

Stainless steel 304 ..... 89.00

Tin ..... 14.00†

Titanium, 99.25 + pct, per lb, f.o.b. $11.25

Tungsten, carbide grades... $3.25

Zinc ..... 19.5 to 32.7

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field		9.875	
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor		12.475	
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30		
		Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, P2, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302				37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	
	410	22.70	24.85	27.00	
	430	23.45	25.65	27.90	

CR Strip (S9) Copper, 10 pct, 2 sides, $43.00; 1 side, $36.10.

(Effective Feb. 6, 1961)

REFRACTORIES

Fire Clay Brick

	Carloads per 1000
Super duty, Mo., Pa., Md., Ky....	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk...	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays	163.00
Chicago District	168.00
Western Utah	183.00
California	185.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O.	163.00-168.00
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union, Pa.	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md.	$620.00
Gary, Ind.	658.50
Standard, Pascagoula, Miss.	647.50
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Baltimore	585.00

Magnesite Brick

Standard, Baltimore	$715.00
Chemically bonded, Baltimore	655.00
Chemically bonded, Pascagoula, Miss.	682.50

Grain Magnesite

St. ⅜ to ½-in. grains

Per net ton

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b., Pascagoula, Miss...	80.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

F.o.b. bulk, producing points in: Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

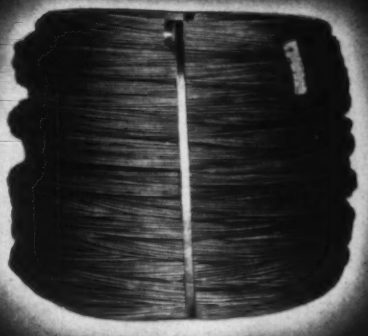
BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
Jones & Laughlin *	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

* Electricweld only.

THE BEST WIRE FOR FASTER OUTPUT...

comes in Continental's cost-saving packages



why go "local" when you can take an "express"!

LEVERPAK, the modern drum container for 12 gauge through 24 gauge, where wire must be kept clean and dry . . . and safe from handling damage. Provides long uninterrupted runs. (Finer gages than above also possible for Leverpak, on inquiry.)

Econo-Coil® Reel unwinds 1500# to 2500# *nonstop,* depending on finish and gage . . . the single length wire that slashes stop-and-go coil changing time, and cuts scrap loss as much as 90 percent! Econo-Coils® are shipped on returnable reels which stack for easy handling when full, or nest when empty to save space.

Econo-Coil® *Reel-less*—If you prefer you can specify Econo-Coils® individually bundled and strapped without reels.

Econo-Coils® can be furnished in a wide range of gages, in many finishes, tempers, and analyses of low and medium low carbon steels. Let us show you how we have helped others speed output and cut production costs . . . with Econo-Coil.®

Wire specialists for over half a century

CONTINENTAL STEEL

CORPORATION KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

GUARANTEED—RE-NU-BILT

Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	Speed
1	6000	G.E.	ATI .8P.F.	2200/6600	600
1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	380
2	1750	G.E.	ATI	2300	3600
2	600	G.E.	TS 7569	2200	1200
1	400	G.E.	TS 7565	2200	1200
1	325	G.E.	ATI 1.0P.F.	440	1800
2	300	Mlbach.	BRKT	2200	1200

SLIP RING

1	1750	G.E.	M-5798	4800	1800
1	800	Whse.	CW	500	1778
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW 4-33-D-15	440	1778
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	856
1	2000	A.C.	ANY	440/2300	720
1	300	G.E.	MTP-561	2300	1800
1	250	G.E.	IM-16	220/440	875
1	250	Cr.Wh.	Size 29Q	2300	350
1	250	G.E.	MT-434Y	4000	257
1	200	G.E.	IB-12B	220	1800
2	200	Whse.	CW-890	2300	1775
1	200	G.E.	IM	2300	580
1	200	G.E.	IM	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
2	100	A.C.		440	690
1	100	G.E.	M-8335Z	220/440	580
1	100	Whse.	CW-754C	220/440	900

SQUIRREL CAGE

8	1600	G.E.	K	2300	3580
1	500	G.E.	FT-559AT	2300	3600
1	500	Whse.	CS-1115	2300	863/445
4	500	Whse.	CS-1216	2300	500
2	450	Ell.	F-3910	2300	1200
1	400	Whse.	CS-7151-610H	4600/4000	3565
1	300	Cant.	NL-6868	440	1750
1	300	G.E.	KT-559A	2300	1775
1	200	Whse.	CS-1002	2300	580
1	250	Whse.	CS-8758	2300	1775
2	200	Whse.	CS-8558	220/440	1750

BELYEA COMPANY, INC.

47 Howell Street, Jersey City 6, N. J.

Tel. OL 3-3334

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

"PACKAGE DRIVES"

FOR ROLLING MILLS & REELS

(1)—3000-HP G.E. Motor, 90/180 R.P.M. and 3000-KW. Al-Chal. M-G Set. 600-VDC & 5000-HP Syn. Motor, 13800/6900/4160-VAC.

(1)—1500-HP G. E. Motor, 165/280 R.P.M.

OR

(1)—1500-HP Whse. Motor, 300/700 R.P.M. and 1500-KW G.E. M-G Set. 250-VDC, 2100-HP Syn. Motor, 4600/2300-VAC.

(2)—750-HP Whse. Motors, 300/700 R.P.M. and 3-unit M-G Set. (2) 600-KW Generators and 1750-HP Syn. Motor, 4000/2300-VAC.

(2)—235-HP Whse. Motors, 325/975 R.P.M. and 3-unit M-G Set. (2) 250-KW Generators and 700-HP Syn. Motor, 4000/2300-VAC.

All D.C. Motors are enclosed, forced ventilated; will sell any of these items separately; can also supply Starting Equipment for Syn. Motors, Exciter Sets and D.C. Control.

SPECIAL Late type 1200-KW Westinghouse M.G. Set (5 yrs. old, used very little), Gen. 600-VDC, 900 R.P.M., 1750-HP Syn. Motor, 80% P.F., 2300-VAC. Complete with cubicle enclosed Magnetic, Reactor Type, Starting Panels. SAVE 60%. Immediate shipment.

T. B. MAC CABE COMPANY

4302 Clarissa St., Philadelphia 40, Penna.

Cable Address "Macsteel" Philadelphia Pa.

Phone DAvenport 4-8300

Slight Gain Reported In Pittsburgh

Used machinery dealers in Pittsburgh say January orders were up slightly.

Customers are still holding off until the last minute before placing orders.

■ Pittsburgh used machinery dealers report a little more activity and a little better feeling.

There has been no decisive upswing, however, and one dealer feels the January gain was simply a matter of order timing. But there is more optimistic talk and there are a few definite signs of increased activity.

One supplier of general equipment reports a 15-20 pct increase in inquiries. Same source says orders are also up a shade. Users are looking for machine tools and specialized production equipment. The heavy stress on late models is taken to mean a push for modernization rather than expansion.

The buying pattern has not changed, says this dealer. Prospects are holding off until the last minute before placing orders. When they do move, customers want rush delivery. Apparently, plants are bidding on jobs and then waiting until they get the contract before putting in equipment.

Another dealer says January was a good month. Activity centered on slitters, levelers and brakes in certain sizes. However, this dealer does not see any sustained trend upward.

"A lot of things we were working on happened to click," he says. "People who had been holding off towards the end of last year finally came in with orders."

Severe winter weather is not helping matters, says the same dealer. People don't go out and inspect machines on sub-freezing days.

A supplier of steel mill equipment sees signs of more activity and improved morale. He admits actual orders have not moved up but he feels they will soon. In line with this thinking, he has just bought 34 small cold rolling mills.

For electrical equipment, orders slumped badly in January. December had seen a pickup after bad months in October and November. Now, business is worse than ever. The reversal possibly reflects the failure of steel mill orders to move up as expected.

Tax Problems

Tax lawyers say used machinery prices could be affected by the Treasury Dept.'s push to limit equipment depreciation for the original owner to the useful life.

This doctrine calls for the owner to estimate salvage value and exclude it from the amount of an investment to be depreciated. The Supreme Court upheld the concept in a recent case involving car rental agencies. The Court said rental companies may not take depreciation on the full purchase price of the car but only on the actual value loss as indicated by resale price.

In effect, this means resale dollars are taxed as income at 52 pct rather than as capital gains at 25 pct. In one recent case, airline equipment was resold at a price far above estimated salvage.

PRIVATE PLANT LIQUIDATION

Inspect Under Power

NEARLY NEW CONDITION

BORING MILLS

SELLERS: 5" Bar Floor Type Horizontal with Floor Plates and Outboard
KING: 42" Vertical Turret Lathe
BULLARD: 36" Vertical Turret Lathe, Spiral Drive
GIDDINGS & LEWIS: #45, 5" Bar, Table Type, Horizontal
GIDDINGS & LEWIS: Model 340T, 4" Bar, Table Type, Horizontal
SELLERS: 5" Bar, Table Type, Horizontal
KING: 100", Heavy Duty Vertical Boring & Turning Mill, 2 Rail Heads, 1 Side Head, New 1943

LATHES

MONARCH: 27"x300" Centers, Model N, 2 Carringes; 18"x72" Centers, Model BB; 16"x54" Centers, Model CY; 27"x156" Centers, Model N; 14"x30" Centers, Model AA; 22"x96" Centers, Model CM
AMERICAN: 40"x312" Centers, 2 Carriages, PRT
PRATT & WHITNEY: 14"x54" Centers, Model C; 16"x54" Centers, Model C
LODGE & SHIPLEY: 18"x54" Centers, Model X; 20"x96" Centers, Model X
NILES: 48"x35' Centers, 2 Carringes, PRT

TURRET LATHES

WARNER & SWASEY: 2A, 3A and 4A Universal, Saddle Type; #5 Universal, Ram Type

GEAR EQUIPMENT

GLEASON: #16 Spiral Bevel (Jobbing Machines), New 1952
GOULD & EBERHARDT: 48H Universal Hobber, New 1944

DRILLS

CINCINNATI BICKFORD: 5' Arm, 15" Column, New 1946 Hardly Used; CARLTON 3' Arm, 9" Column; 4' Arm, 11" Column; 4' Arm, 9" Column; 5' Arm, 15" Column; AMERICAN 6' Arm, 15" Column (Hole Wizard)

MILLERS

VAN NORMAN: Model 6, 12 and 22L Universal, Ram Type
KEARNEY & TRECKER: Model 4K, 5H and 5HM, Plain, Horizontal
KEARNEY & TRECKER: Model 3K, Universal, Horizontal
KEARNEY & TRECKER: Model 2CH Vertical, New 1954
BROWN & SHARPE: #12 Production, 24" feed New 1948

PRESSES

BIRDSBORO: Cap. 800 Tons Straightening Press, Self Contained, Hydraulic, New 1941
HPM: Model CU-2, Cap. 400 Tons, Self Contained, Hydraulic, New 1949
BLISS: #318, SS, Cap. 1500 Tons, New 1951; #310, SS, Cap. 500 Tons, New 1947; #312A, SS, Cap. 720 Tons, New 1951; #309, SS, Cap. 405 Tons, New 1947; #312, SS, Cap. 720 Tons, New 1947; #60¼, SS, Cap. 1200 Tons
LAKE ERIE: 235 Tons, bed 46"x46", Self Contained, Hydraulic, New 1952
TOLEDO: 96C, SS, Cap. 405 Tons
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BUFFALO: #15 Billet Shears, Cap. 8" Round, New 1955, Never Used
NIAGARA: 120"x⅜" Cap. Power Shear
CLEVELAND: Model 80-EG-84 Combination Gang Punch & Shear, Cap. 300 Tons, New 1946
CINCINNATI: Model 2510 Power Shear, Cap. 120"x⅜", New 1949

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FOSDICK: #30, Table 36"x18"
PRATT & WHITNEY: Model 2A, 44"x22"

GRINDERS

CINCINNATI: #3 Centerless, Model EA (Filmatic), New 1944
CINCINNATI: 12"x36" Centers, Universal, Model EK
BROWN & SHARPE: #3 Universal
ABRASIVE Model 3B, 8"x24" Surface, New 1946
NORTON: #2 Universal Cutter & Tool, New 1946
HAMMOND: Model 14 SW, Carbide, New 1950

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GOULD & EBERHARDT: 32" Universal Shaper; 16"-20" Shaper (Industrial)
ROCKFORD: 36" Vertical Slotter, Hydraulic, New 1946

MISCELLANEOUS

YORK: Model SPH 54-210-6 (Steam Pak Boiler) 250 HP, New 1958, Never Used
CHICAGO (DREIS & KRUMP): Model 608D Press Brake, Cap 7/16"x12', New 1949
CHAMBERSBURG: 3000 lb "Ceco" Hammer New 1952
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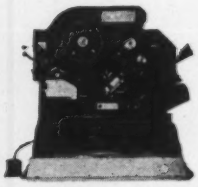

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An asterisk indicates that a booklet, or other information, is offered in the advertisement.

This index is published as a convenience. No liability is assumed for errors or omissions.

A

Acme-Newport Steel Co. 121
*Advance Glove Mfg. Co. 98
Aetna-Standard, Div. Blaw-Knox Co. 16
Air Reduction Sales Co. Div. ... 64
Ajax Electric Motor Corp. 168
American Air Compressor Corp. . 168
*American Chain & Cable Co. Inc., Wright Hoist Div..... 25
*American Shear Knife Co. 42
*Apex Machine & Tool Co. 23
Associated Spring Corp. 104

B

*Babcock & Wilcox Co. Refractories Div. 92
Barnes, Wallace Co. Div. Associated Spring Corp. 104
Barnes-Gibson-Raymond, Inc., Div. Associated Spring Corp. .. 104
Bay State Abrasive Products Co. 34-35
Belyea Co., Inc. 166
Beryllium Corp. 20
Bethlehem Steel Co. 1
Blaw-Knox Co., Aetna-Standard Div. 16
Blaw-Knox Co., Foundry & Mill Machinery Div. 123
*Bliss & Laughlin, Inc. 37

C

Carpenter Steel Co. 129
Chicago Screw Co. 58
Cincinnati Milling Machine Co., Cincinnati Milling Products Div. 22
*Circular Tool Co., Inc. 133
*Cleveland Crane & Engineering Co., Steelweld Machinery Div. . 63
*Cleveland Metal Abrasive Co... 122
Columbia-Geneva Steel Div., United States Steel Corp. 66-67
Columbus McKinnon Chain Corp. 19
*Commercial Shearing & Stamping Co. 102-103
Cone-Drive Gears Div., Michigan Tool Co. 130
Cosumers Steel & Supply Co. 169
Continental Steel Corp. 165
*Copperweld Steel Co., Aristoloy Steel Div. .....Inside Front Cover
Copperweld Steel Co., Superior Steel Div. 88
Crucible Steel Co. of America .. 138
Curry & Hudson Associates, Inc. .. 168
Cutler-Hammer Inc. 44-45

D

*Danly Machine Specialties, Inc. 99
*Denison Engineering Div., American Brake Shoe Co. 31
*Dreis & Krump Mfg. Co. 21
Dunbar Bros. Co., Div. Associated Spring Corp. 104
*du Pont, E. I., de Nemours & Co., Inc. 53-54

E

Eastern Machinery Co. 168
Electric Equipment Co. 169
Electric Furnace Co. 8
Electrode Div., Great Lakes Carbon Corp. 74
*Erickson Tool Co. 52
Erie Bolt & Nut Co. 140

F

Federal Machine & Welder Co.... 142
*Finkl, A. & Sons Co. 55
Forging Equipment Co. 169
Frasse, Peter A. & Co., Inc. 148

G

*Garlock, Inc. 135
Gibson, Wm. D. Co., Div. Associated Spring Corp. 104
Gilbert Merril Steel Corp. 169
*Gisholt Machine Co. 40
Goodman Electric Machinery Co. 169
Goodrich, B. F., Industrial Products Co. 36
Goss & DeLeeuw Machine Co. ... 170
Great Lakes Carbon Corp. 74
Gulf Oil Corp. 136-137

H

Hamilton Foundry, Inc. 131
*Hansen Mfg. Co. 134
Hartford Machine Screw Co. 58
Heller's Son Inc., E. G. 168
Hendrick Manufacturing Co. 69
Holo-Krome Screw Corp. 106
*Houghton, E. F. & Co. 65
Hughes, Arnold, Co. 168-169
Hyman, Joseph & Sons 169

I

*Industrial Distributors (Sales) Ltd. 38-39
Inland Steel Co. 6
International Nickel Co., Inc. ... 72
Iron & Steel Products, Inc. 168

K

Kaiser Aluminum & Chemical Sales Inc. 10
Kaiser Fleetwings, Inc. 168
Kano Laboratories 151
Koopers Co., Inc. 28-29

L

Lindberg Engineering Co. 47

M

MacCabe, T. B. Co. 166
Mackintosh-Hemphill Div., E. W. Bliss Co. .....Back Cover
*Marchant, Geo. F. Co..... 146
Metallurigical Products Department, General Electric Co. 68
Michigan Tool Co., Cone-Drive Gears Div. 130
Midwest Steel Co. 62
Monsein, S. S. 169

N

National Machinery Exchange ... 169
*National-Standard Co. 49-51
National Steel Corp. 62
National Tube Div., United States Steel Corp. 66-67
*Nicholson File Co. 41

O

Oakite Products, Inc. 141
Ohio Steel Foundry Co. 97
Ornitz Equipment Corp. 169
Ottemiller, Wm. H. Co. 170

P

*Parish Pressed Steel Div., Dana Corp. 59
Parker Rust Proof Co. 60-61
Pollock Industries, Inc. 168
*Posen & Kline Tube Co., Inc. ... 17

R

Raymond Manufacturing Co., Div. Associated Spring Corp. 104
Reed Instrument Bearing Co., Div. SKF Industries, Inc. 14
*Republic Steel Corp. 26-27
Revere Machinery Corp. 167
Rhode Island Tool Co. 151
Robbins & Myers, Inc. 76
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp. ... 71
*Rotor Tool Co. 101
*Rubber & Asbestos Corp. 151
Russell, Burdsall & Ward Bolt & Nut Co. 90
Ryerson, Jos. T. & Son, Inc. 4

S

SKF Industries, Inc., Reed Instrument Bearing Co. Div. ... 14
*Sandvik Steel, Inc. 94
Saxony Press, Inc. 169
*Signode Steel Strapping Co. 12
Stamco, Inc. 132
Stanhope, R. C., Inc. 169
Standard Screw Co. 59
State Equipment Co. 169
Steel Service Center Institute ... 30
*Steelweld Div., Cleveland Crane & Engineering Co. 63
Sumitomo Metal Industries, Ltd... 163
Superior Steel Div., Copperweld Steel Co. 88
Swift-Ohio Corp. 153

T

Tennessee Coal & Iron Div., United States Steel Corp. 66-67
Timken Roller Bearing Co. 32-33
Tinnerman Products, Inc. 127
Torrington Co. 124
*Turco Products, Inc. 145

U

United Engineering & Foundry Co. 73
United States Steel Corp...56-57, 66-67
United States Steel Export Co....66-67
United States Steel Supply Div., U. S. Steel Corp. 56-57
United States Steel Supply—Steel Service Centers Div., United States Steel Corp. 66-67

V

*Vanadium Corp. of America 24
Vollrath Co. 100
Voss Engineering Co. 46

W

Wallack Bros. 169
Washington Steel Corp. 18
Wean Engineering Co., Inc. .....Inside Back Cover
Weirton Steel Co. 62
Weiss Steel Co., Inc. 169
Western Automatic Machine Screw Co. 58
*Westinghouse Electric Corp., Sturtevant Div. 43
Wheland Co. 98
Whisler Equipment Co. 168
*Wright Hoist Div., American Chain & Cable Co., Inc. 25
*Wrought Washer Mfg. Co. 144
Wyckoff Steel Co. 143

Y

Yale & Towne Manufacturing Co.. 48
*Yoder Co. 70

CLASSIFIED SECTION

Clearing House 166-169
Contract Manufacturing Appears in first and third issue of each month. See February 16, issue
Employment Exchange 169
Equipment & Materials Wanted.. 169

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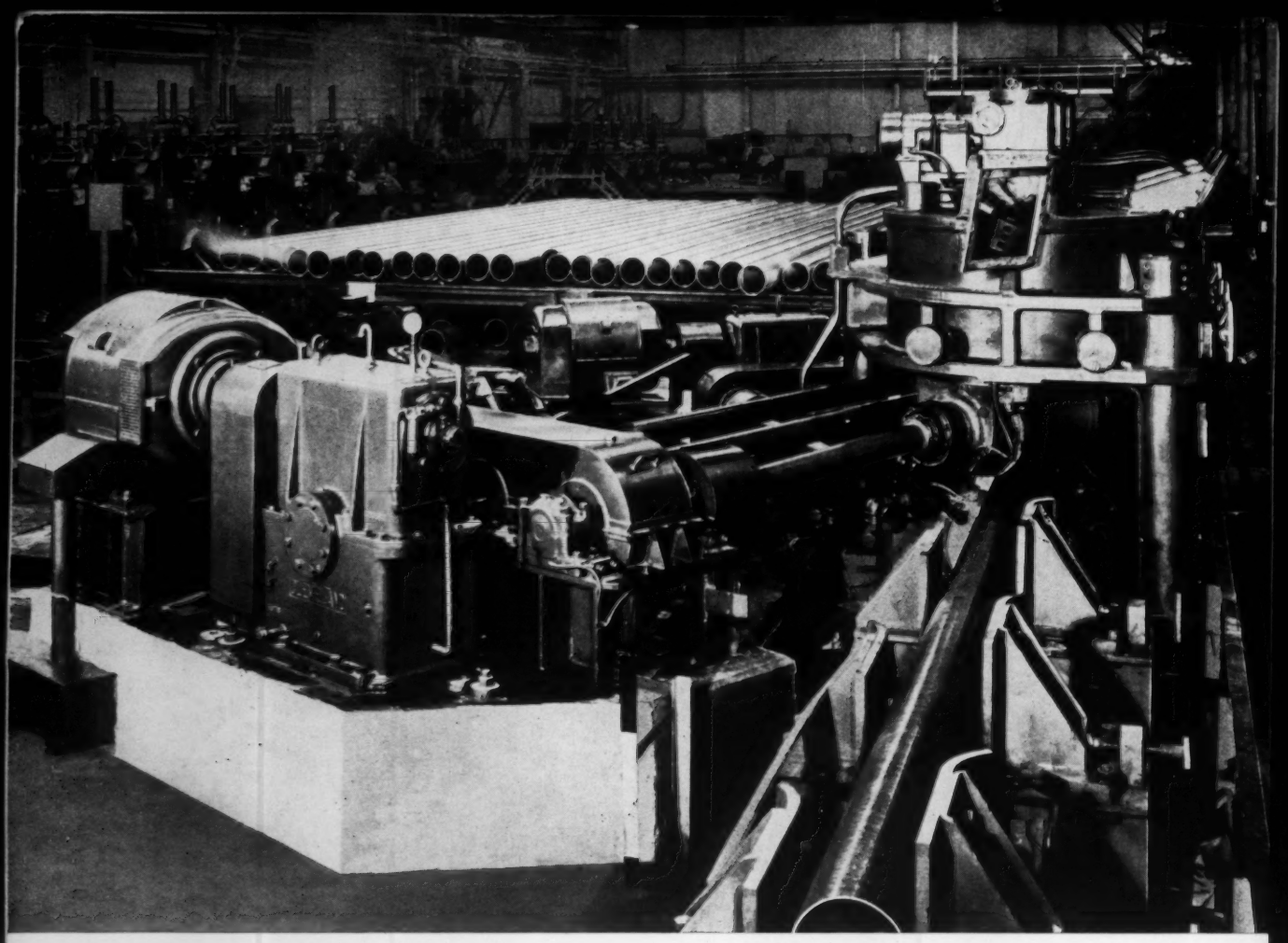

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